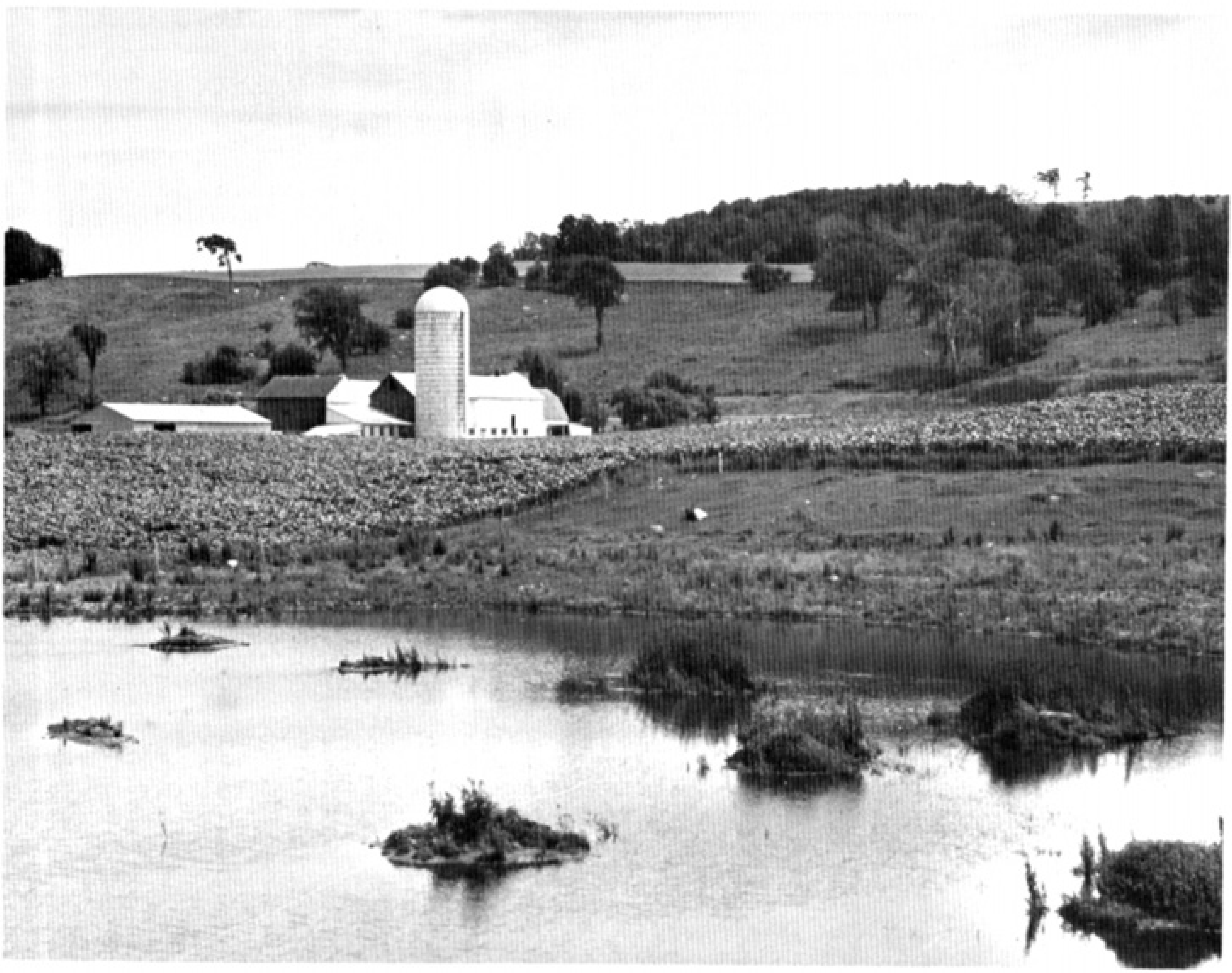
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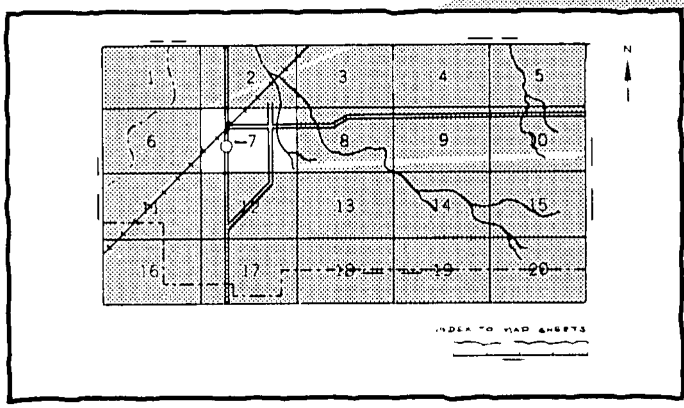
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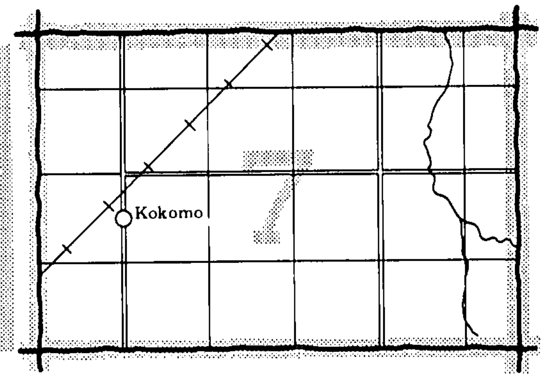


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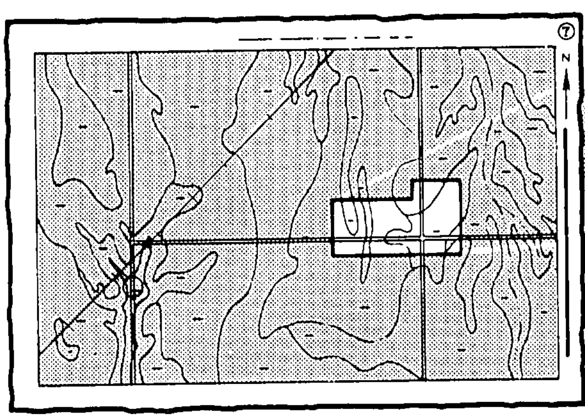
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

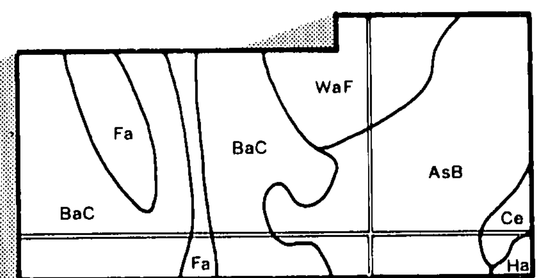




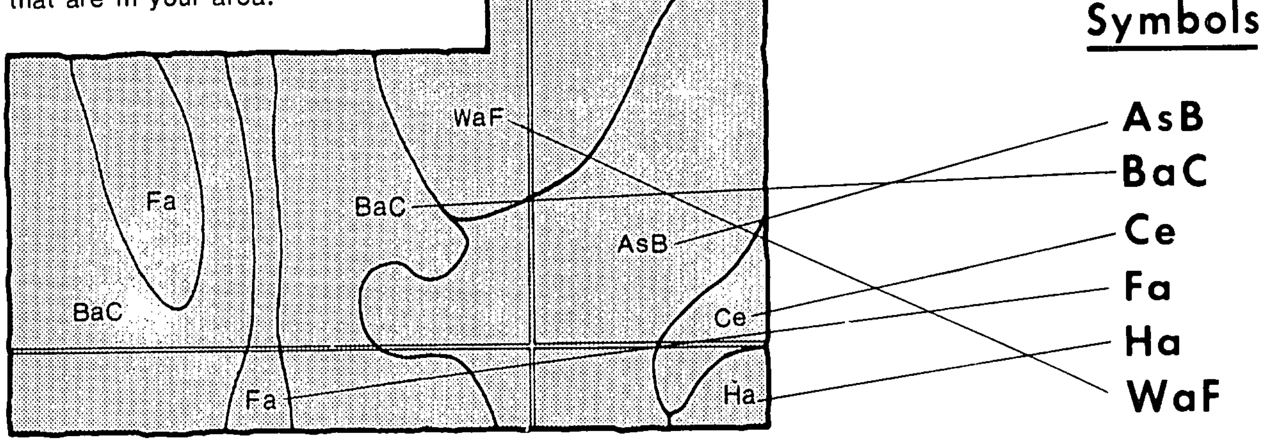
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



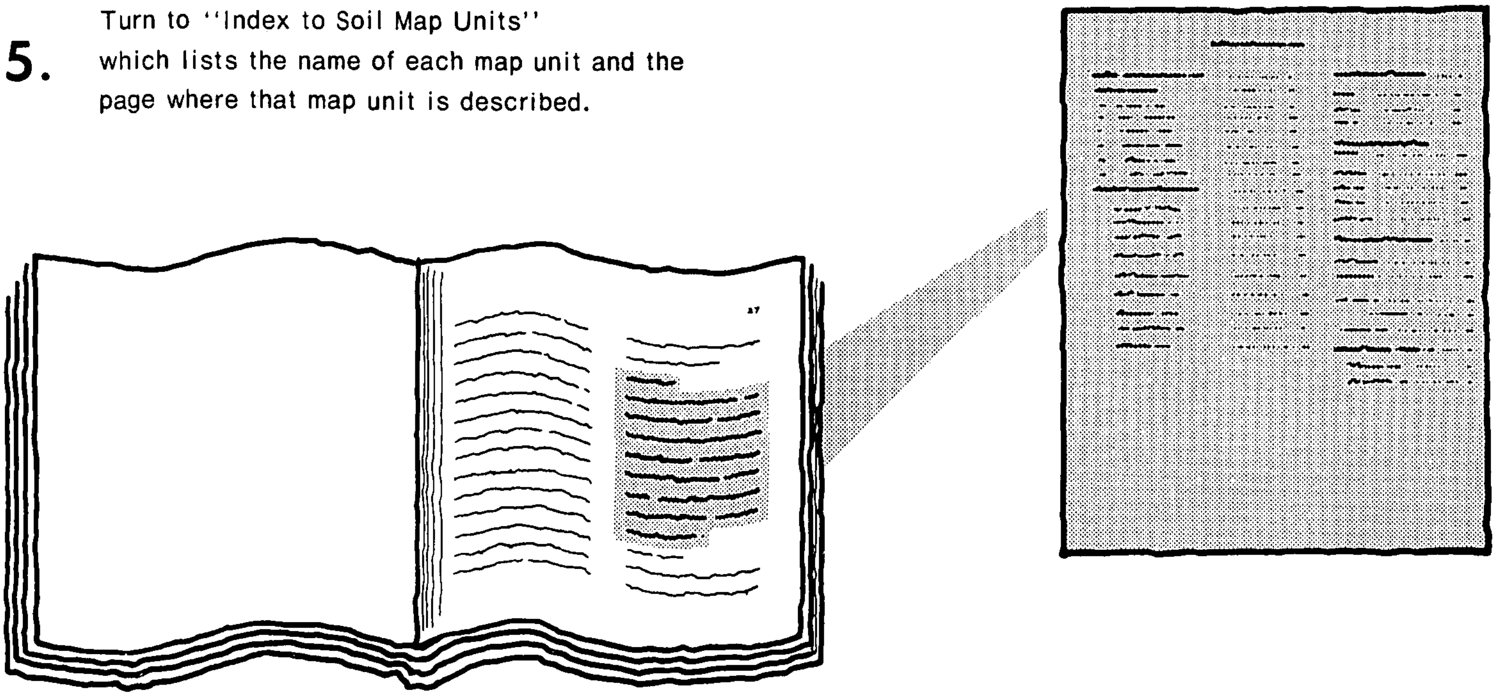


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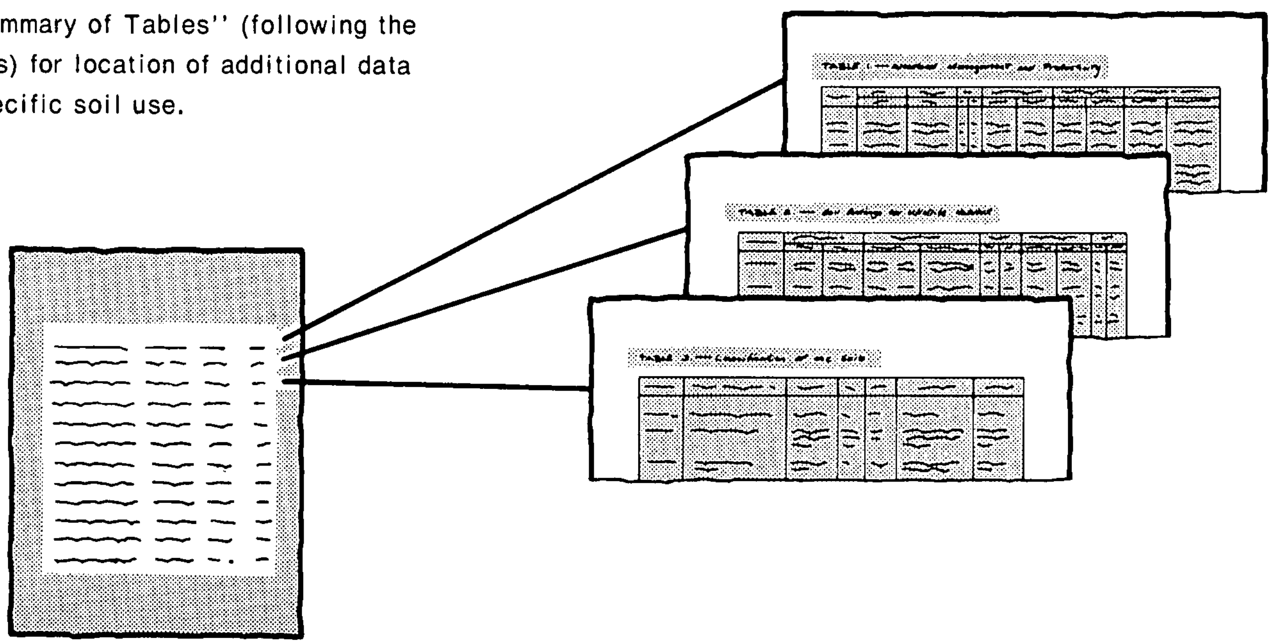


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1965 to 1973. Soil names and descriptions were approved in 1974. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1974. This survey was made cooperatively by the Soil Conservation Service and the Cornell University Agricultural Experiment Station. It is part of the technical assistance furnished to the Madison County Soil and Water Conservation District. Partial funding of this survey was provided by the Madison County Board of Supervisors through the Madison County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: The manmade wildlife pond in the foreground is on very poorly drained Halsey silt loam. Well drained and somewhat excessively drained Palmyra gravelly loam, undulating, in the background is used for crops associated with dairy farming.

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Foreword

The Soil Survey of Madison County, New York contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

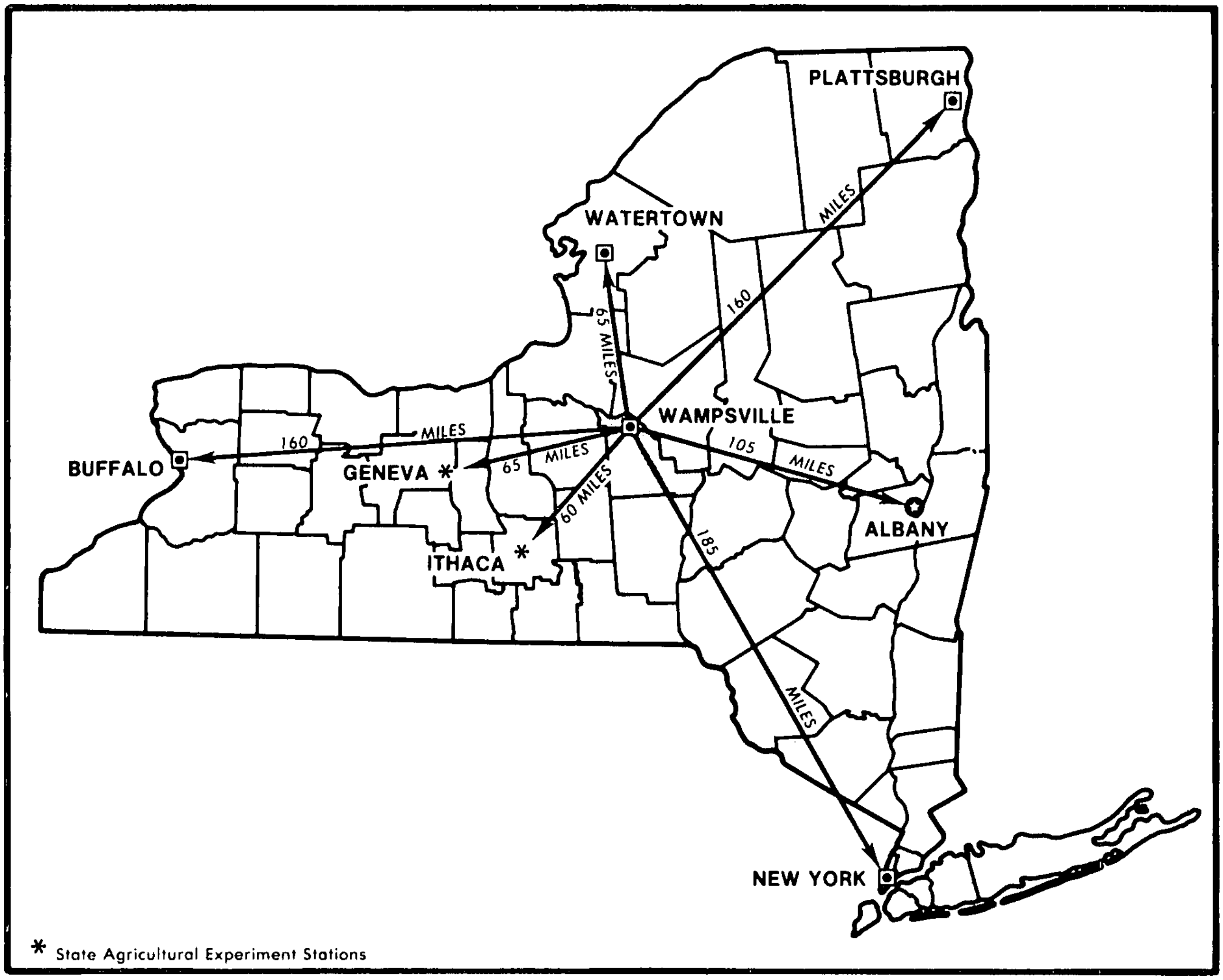
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

Robert L. Hilliard
State Conservationist
Soil Conservation Service



Location of Madison County in New York.

SOIL SURVEY OF MADISON COUNTY, NEW YORK

By W. E. Hanna

Fieldwork by E. B. Giddings, C. E. Rice, B. R. Laux, J. E. Witty,
and W. E. Hanna, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service,
in cooperation with Cornell University Agricultural Experiment Station

MADISON COUNTY is adjacent to the southern shore of Oneida Lake in the central part of New York State (see facing page). It is bounded on the northeast and east by Oneida and Otsego Counties, on the south by Chenango County, and on the west by Onondaga and Cortland Counties.

The county is rural. It covers an area of 423,040 acres or 661 square miles. It is roughly triangular in shape, and the northern end is the narrowest dimension. Average width, from east to west, is 22 miles. Average length, from north to south, is about 30 miles.

The county has a population of about 64,000. It has one city, Oneida, and several smaller villages. Wampsville is the county seat.

In 1969, slightly more than half of the land area in Madison County was in active farms, according to the Bureau of Census. About 46 percent of the farmland was in crops, 30 percent was in pasture, and 18 percent was in woodland.

The most extensive farm enterprise is dairying. Less extensive are areas used for growing vegetable and cash crops and for raising beef cattle and poultry. Woodland, including small woodlots on farms, makes up about 45 percent of the survey area. Most of the wooded areas are in the southern part of the county, and several large tracts are owned by the State of New York.

The steep, north-facing Onondaga Limestone escarpment divides the county into two physiographic provinces: the Appalachian Plateau in the south and the lower-lying Ontario (Oneida) Plain in the north.

The most extensively grown crop on the plateau is hay. Next in extent are corn, oats, and wheat, in that order. These crops are grown intensively on the high lime soils on the northern part of the plateau. On the higher, southern part of the plateau, a large acreage is no longer cropped because of a relatively short growing season, steep topography, and low natural fertility of many of the soils. The principal soil management concerns on farmland on the plateau are improving the natural drainage and controlling erosion. About 25 percent of this land needs some type of artificial drainage before the soils can be used intensively for crops (*13*).

On the Ontario Plain, also called the Oneida Lake Plain, there are a few areas where special crops, for example, potatoes and sweet corn, are grown. A fairly large acreage of onions is grown on organic (muck) soils near the village of Canastota.

Major transportation routes traversing the lake plain provide easy access to produce markets in neighboring cities, for example, in Syracuse and Utica. In recent times, residential development on the Oneida Lake Plain has expanded considerably, particularly along the western edge. Improvement of natural drainage is the principal soil management concern for urban and farm uses of the soils.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Description of the soils."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The soils in the survey area vary widely in their suitability for major land uses. An interpretive table is enclosed with the general soil map in an envelope at the back of this survey. The table shows the proportionate extent of the major soils in each map unit shown on the general soil map. It gives general ratings of the suitability of the major soils in each map unit for selected land uses: community development, recreational development, farming, and woodland. Soil properties that pose limitations to the use are indicated. The ratings of soil suitability are based on the assumption that practices in common use in the survey area are being used to overcome soil limitations. These ratings reflect the ease of overcoming the soil limitations and the probability of soil problems persisting after such practices are used.

Terms for texture used in the descriptive heading for several of the map units refer to texture of the surface layer of the dominant soils. For example, in the descriptive heading for Appleton-Lyons, nearly level, the words *medium textured* refer to texture of the surface layer of the Appleton and Lyons soils.

Terms for drainage class used in the descriptive heading refer to the drainage class of the dominant soils of the map unit.

The names of the map units indicate their dominant slope. The map units may have soils of minor extent that are less sloping or more sloping than is stated in the name of the unit. The range in slope for these minor, included soils is given in the text.

The Madison County general soil map joins along its western border with that of Onandaga County. It does not join with the Cortland County general soil map. Madison County is also adjacent to Oneida and Chenango Counties, but mapping of these survey areas was not completed at the time this survey was written.

Deep soils that formed in glacial till

The 11 map units in this group are mainly in the uplands. Small islandlike areas are on the lake plain. The soils in this group make up about 31.9 percent of the land area in the county. They formed largely in glacial till deposits derived from limestone, shale, and sandstone. They are mainly deep, well drained to very poorly drained, and dominantly medium textured. The soils range from nearly level to very steep, but soils that are gently sloping or sloping are the most extensive.

1. Appleton-Lyons, nearly level

Deep, somewhat poorly drained to very poorly drained, medium textured soils; in uplands and in islandlike areas on lake plains

This map unit consists of nearly level and gently sloping soils on glacial till plains. It is in low, broad, islandlike areas on the lake plain and in low areas in the uplands. Slopes range from 0 to 8 percent but are mostly 0 to 3 percent.

This map unit makes up about 1.7 percent of the county. Appleton soils make up about 40 percent of the unit and Lyons soils make up about 35 percent. Soils of minor extent make up the rest.

Appleton and Lyons soils formed in similar glacial till deposits that contain fragments of limestone, shale, and sandstone.

Appleton soils are deep, somewhat poorly drained, and medium textured. They have a seasonal high water table in spring. The water table commonly is perched above the slowly permeable subsoil and substratum. These nearly level and gently sloping soils are on concave foot slopes and broad flats. They are in positions slightly higher than Lyons soils in depressions.

Lyons soils are deep and are very poorly drained and poorly drained. The surface layer is medium textured, and the subsoil is medium textured or moderately fine textured. These soils have a water table near the surface for long periods during the year. The water table commonly is perched above the slowly permeable or very slowly permeable substratum. These nearly level soils generally are in slight depressions.

Soils of minor extent are in the Hilton, Lima, Alden, and Carlisle series. Moderately well drained Hilton and Lima soils are on a few slightly elevated knolls. Very poorly drained Alden soils that have a thin silty colluvial mantle are in depressions. Carlisle soils are in a few small, deep depressions that have accumulations of decomposed organic material.

This map unit is used mainly for permanent pasture and woodland. Some large areas are idle. A few areas are drained and are used for crops. Wetness and moderately slow to very slow permeability are the principal limitations to the use of the soils for nonfarm purposes. Some areas have good potential for development of wetland wildlife habitat.

2. Cazenovia, gently sloping

Deep, well drained and moderately well drained, medium textured soils; on uplands

This map unit consists of gently sloping and sloping soils on glacial till plains on the upland plateau. The landscape is a series of knolls and ridges. Slopes range from 3 to 15 percent but are dominantly 3 to 8 percent.

This map unit makes up about 3.2 percent of the county. About 70 percent of the unit is Cazenovia soils, and the rest is soils of minor extent.

The Cazenovia soils formed in glacial till deposits derived mainly from soft red shale and limestone. These soils are deep and are well drained and moderately well drained. They have a medium textured surface layer and a dominantly moderately fine textured subsoil. The substratum is slowly permeable. These soils commonly have a perched water table for brief periods in spring. They are on broad, convex knolls and ridges.

Soils of minor extent are mostly in the Ovid, Honeoye, Lairdsville, and Schoharie series. The somewhat poorly drained and moderately well drained Ovid soils are along field drainageways and on foot slopes. Well drained Honeoye soils are intermingled in some areas. Lairdsville soils are in places where soft shale bedrock is within 20 to 40 inches of the surface. Moderately well drained and well drained Schoharie soils are in a few areas that have lacustrine sediment. Moderately steep Cazenovia soils are in small areas on the sides of some ridges. A few areas of severely eroded soils are also in this map unit.

This map unit is used for cultivated crops, pasture, and woodland. Most crops are used in dairy farming. This map unit is suited to general field crops. In some years, however, temporary wetness in spring slightly delays planting of some crops, for example, corn. Temporary seasonal wetness and slow permeability in the substratum are the main soil limitations to the use of this map unit for some nonfarm purposes.

3. Hilton-Appleton, gently sloping

Deep, moderately well drained and somewhat poorly drained, medium textured soils; in islandlike areas on the lake plain

This map unit consists of nearly level and gently sloping, glacial till soils in islandlike areas on the lake plain. The landscape is mainly a series of low, long, narrow ridges (fig. 1). Slopes range from 0 to 8 percent but are mostly 3 to 8 percent.

This map unit makes up about 1.2 percent of the county. Hilton soils make up about 45 percent of the unit and Appleton soils make up about 30 percent. Soils of minor extent make up the rest.

Hilton and Appleton soils formed in glacial till deposits derived from limestone, sandstone, and shale.

Hilton soils are deep and moderately well drained. They have a medium textured surface layer and a medium textured or moderately coarse textured subsoil. A temporary seasonal high water table generally is present early in spring and is perched above the slowly permeable substratum. These soils are on the sides and tops of low, convex ridges and knolls.

Appleton soils are deep, somewhat poorly drained, and medium textured. A seasonal high water table is present in spring. It commonly is perched above the slowly permeable subsoil and substratum. These soils are on the lower sides of ridges and in slightly concave areas between knolls.

Soils of minor extent are Collamer and Lyons soils and Ontario Variant soils. Moderately well drained Collamer soils are in a few small areas containing silty lacustrine deposits. Very poorly drained and poorly drained Lyons soils are along drainageways and in a few depressions. Well drained Ontario Variant soils are on slightly higher ridges.

This map unit is used mainly for crops and residential development. Such crops as corn, wheat, and dry beans grow well, especially on the better drained soils of the unit. Some areas that previously were farmed are idle. Seasonal wetness and slow permeability in the substratum are the main limitations to the use of this map unit for many nonfarm purposes.

4. Honeoye-Cazenovia, moderately steep

Deep, well drained and moderately well drained, medium textured and moderately fine textured soils; on valley sides and adjacent uplands

This map unit consists of moderately steep and steep soils on glacial till plains. It is on valley sides and hillsides on the upland plateau. Slopes range from 15 to 50 percent but are mainly less than 25 percent.

This map unit makes up about 1.2 percent of the county. Honeoye soils make up about 50 percent of the unit, and Cazenovia soils make up about 30 percent. Soils of minor extent make up the rest.

Honeoye and Cazenovia soils formed in glacial till deposits derived mainly from limestone and shale.

Honeoye soils are deep, well drained, and medium textured. They are moderately permeable in the surface layer and subsoil and slowly permeable in the substratum. These soils are on convex and plane slopes and are commonly slightly higher on the landscape than the Cazenovia soils.

Cazenovia soils are deep and are well drained and moderately well drained. These soils have a medium textured surface layer and a moderately fine textured subsoil. In spring a temporary seasonal high water table commonly is perched above the slowly permeable substratum. These soils commonly are on plane and slightly convex slopes on the lower part of valley sides.

Soils of minor extent are in the Wassaic, Aurora, and Lansing series. The well drained and moderately well drained Wassaic soils and the moderately well drained Aurora soils are in places where bedrock is within 20 to 40 inches of the surface. Lansing soils are in a few areas that have a high content of sandstone and siltstone. Some areas of Honeoye and Cazenovia soils that have slopes of less than 15 percent are also in this map unit, mostly along the upper part of valley sides.

This map unit is used mainly for woodland and permanent pasture. Many areas are idle and are reverting to brush and trees. Slope and the associated hazard of erosion are the principal limitations to the use of this map unit. Some areas have potential for development of wildlife habitat or as open space corridors.

5. Honeoye-Farmington, steep

Deep and shallow, well drained, medium textured soils; on uplands and valley sides

This map unit consists of steep and very steep soils along the escarpment front of the upland plateau and on the sides of some major valleys. Slopes range from 25 to 70 percent but are mainly 25 to 50 percent.

This map unit makes up about 1.2 percent of the county. Honeoye soils make up about 50 percent of the unit, and Farmington soils make up about 25 percent. Soils of minor extent make up the rest.

Honeoye and Farmington soils formed in similar glacial till deposits that contain limestone fragments and shale.

Honeoye soils are deep, well drained, and medium textured. They have a moderately permeable subsoil and a slowly permeable substratum. These steep soils are on slightly convex and plane slopes.

Farmington soils are shallow, well drained, and medium textured. These soils are underlain by bedrock at a depth of 10 to 20 inches that is mainly limestone. Permeability in the soil mantle is moderate. These steep and very steep soils generally are closely intermingled with the deep Honeoye soils.

Soils of minor extent are mainly in the Wassaic, Aurora, Lairdsville, and Cazenovia series. Moderately deep Wassaic soils are in a few areas between the shallow Farmington soils and the deep Honeoye soils. Moderately well drained Aurora soils are in places where the underlying bedrock is mainly dark shale. Fine textured Lairdsville soils are on the lower part of slopes and are underlain by soft red shale bedrock. Deep Cazenovia soils, which have a finer textured subsoil than Honeoye soils, are in a few areas. Some large areas where there are ledges of rock outcrops and areas of soils that are less than 10 inches deep to bedrock are also in this map unit.

This map unit is mainly in trees or brush. Some areas are in low quality permanent pasture. Slope is the principal limitation to most uses of this map unit. A few areas have potential for limestone quarries. Many areas that have a scenic view of the Oneida Lake Plain have potential as sites for parks or as open space corridors.

6. Honeoye-Lima, gently sloping

Deep, well drained and moderately well drained, medium textured soils; on uplands

This map unit consists of nearly level to sloping soils on glacial till plains on the upland plateau. It covers an extensive area in the county. The landscape consists of hilltops, hillsides, ridges, and undulating and rolling plains. Slopes range from 0 to 15 percent but are dominantly 3 to 8 percent.

This map unit makes up about 9.6 percent of the county. Honeoye soils make up about 60 percent of the unit, and Lima soils make up about 15 percent. Soils of minor extent make up the rest.

Honeoye and Lima soils formed in similar glacial till deposits derived from limestone, shale, and sandstone.

The Honeoye soils are deep, well drained, and medium textured. In some years these soils have a perched water table above the slowly permeable substratum for very brief periods early in spring. These gently sloping and sloping soils are in convex areas and receive a very small amount of runoff.

Lima soils are deep, moderately well drained, and medium textured. These soils have a seasonal high water table perched above the slowly permeable substratum for part of the spring. They are nearly level to sloping and are in a slightly lower position on the landscape than the well drained Honeoye soils. They commonly receive some runoff.

Soils of minor extent are in the Appleton, Cazenovia, Palmyra, and Aurora series. The somewhat poorly drained Appleton soils are along field drainageways and on foot slopes. Well drained and moderately well drained Cazenovia soils are in a few small areas where the till deposits are slightly finer textured than those of the major soils. Well drained and somewhat excessively drained Palmyra soils are intermingled with the major soils in small areas of glacial outwash deposits. Moderately well drained Aurora soils are in places where shale bedrock is within 20 to 40 inches of the surface.

This map unit is used mainly for cultivated crops and hay. It is well suited to crops used in dairy farming, for example, corn, oats, and alfalfa for hay. A few areas are wooded and produce high quality timber. Slow permeability in the substratum and temporary seasonal wetness in some areas are the principal limitations to the use of this map unit for nonfarm purposes.

7. Lansing-Aurora, moderately steep

Deep and moderately deep, well drained and moderately well drained, medium textured soils; on valley sides and uplands

This map unit consists of moderately steep soils on glacial till plains on the upland plateau. The landscape consists of valley side slopes and sides of elongated hills. Slopes mostly range from 15 to 25 percent.

This map unit makes up about 1.0 percent of the county. About 50 percent of the unit is Lansing soils, and 25 percent is Aurora soils. The rest is soils of minor extent.

The Lansing soils formed in glacial till deposits that contain fragments of sandstone, shale, and limestone. These soils are deep, well drained, and dominantly medium textured. Permeability in the substratum is slow. In some years these soils have a perched water table above the substratum for very brief periods in spring. These soils are in convex areas that are mostly on valley sides and hillsides.

The Aurora soils formed in glacial till deposits mainly derived from dark shale. These soils are moderately deep and moderately well drained. They have a medium textured surface layer and a medium textured and moderately fine textured subsoil and substratum. Permeability is slow in the subsoil and substratum. These soils have a temporary seasonal high water table in spring. The water table commmonly is perched above the bedrock or dense substratum. These soils are on valley sides and hillsides and commonly are slightly lower on the landscape than Lansing soils.

Soils of minor extent are mainly in the Lordstown, Honeoye, and Stockbridge series. Moderately deep Lordstown soils, which have a coarser textured subsoil than the Lansing and Aurora soils, are in places where sandstone or siltstone is more prominent. Well drained, steep Honeoye soils are in a few areas. Well drained Stockbridge soils are intermingled with the major soils along the lower part of valley walls. A few areas of sloping Lansing and Aurora soils are along the upper part of valley sides. A few areas of rock outcrops are also in this map unit.

8. Lansing-Conesus, sloping

Deep, well drained and moderately well drained, medium textured soils; on uplands

This map unit consists of gently sloping and sloping soils on glacial till plains on the upland plateau. The landscape consists mainly of broad drumlinlike hills. Slopes range from 3 to 15 percent but are mainly 8 to 15 percent.

This map unit makes up about 5.5 percent of the county. About 65 percent of the unit is Lansing soils, and 15 percent is Conesus soils. The rest is soils of minor extent.

Lansing and Conesus soils formed in similar glacial till deposits that contain fragments of sandstone, shale, and limestone.

Lansing soils are deep, well drained, and dominantly medium textured. Permeability is moderate in the subsoil and slow in the substratum. In some years these soils have a perched water table above the substratum for very brief periods in spring. Slopes are convex. These soils are mostly on the top and upper side slopes of broad hills.

The Conesus soils are deep, moderately well drained, and dominantly medium textured. Permeability is slow in the substratum. These soils have a temporary seasonal high water table that is perched above the substratum in spring. Slopes are slightly convex and plane. These soils are on lower side slopes and generally are lower on the landscape than Lansing soils.

Soils of minor extent are in the Appleton, Honeoye, Stockbridge, and Aurora series. The somewhat poorly drained Appleton soils are in drainageways and on concave foot slopes. Well drained Honeoye soils that have a higher limestone content than the dominant soils are in a few areas. Stockbridge soils that have a slightly coarser textured subsoil than Lansing soils and have a lower content of limestone than the dominant soils are intermingled in a few areas. Aurora soils are in a few areas where shale bedrock is within 40 inches of the surface. Moderately steep Lansing soils are on the sides of some ridges.

This map unit is used mainly for hay and pasture and for cultivated crops. Most crops are used in dairying. Some areas are wooded. Slow permeability in the substratum, slope, and seasonal wetness in some areas are the principal limitations to the use of this map unit. Some areas have a scenic view.

9. Lima-Appleton, gently sloping

Deep, moderately well drained and somewhat poorly drained, medium textured soils; on uplands

This map unit consists of nearly level and gently sloping soils on glacial till plains. It is on the lower side slopes

of hills and ridges and in other moderately low areas on the upland plateau that commonly receive runoff. Slopes range from 0 to 8 percent but are mostly 3 to 8 percent.

This map unit makes up about 1.8 percent of the county. Lima soils make up about 40 percent of the unit, and Appleton soils make up about 40 percent. Soils of minor extent make up the rest.

Lima and Appleton soils formed in similar glacial till deposits derived from limestone, shale, and sandstone.

The Lima soils are deep, moderately well drained, and medium textured. A temporary seasonal high water table is in the lower part of the subsoil for part of the spring. It is perched above the slowly permeable substratum. These soils are on lower side slopes and small rises higher on the landscape than Appleton soils.

Appleton soils are deep, somewhat poorly drained, and medium textured. A seasonal high water table is above the slowly permeable substratum in the spring and in other excessively wet periods. These soils are on the base of foot slopes and in narrow flats below the moderately well drained Lima soils.

Soils of minor extent are in the Lyons, Honeoye, and Wayland series. Very poorly drained and poorly drained Lyons soils are in depressions. Well drained Honeoye soils are on a few slightly elevated knolls. Poorly drained and very poorly drained Wayland soils are on low, narrow flood plains along small streams that cross this map unit in places. Sloping Lima soils are in a few areas.

This map unit is used mainly for hay and pasture and for woodland. Areas that are used for crops generally are artificially drained. Seasonal wetness and slow permeability are the main limitations to the use of this map unit for most purposes. Some areas have potential as sites for ponds.

10. Stockbridge, sloping

Deep, well drained, medium textured soils; on uplands and adjacent valley sides

This map unit consists of gently sloping and sloping soils on glacial till plains on the upland plateau. The landscape consists of broad hilltops, hillsides, and the lower part of valley sides. Slopes range from 3 to 15 percent but are mainly 8 to 15 percent.

This map unit makes up about 4.7 percent of the county. About 65 percent of the unit is Stockbridge soils, and the rest is soils of minor extent.

Stockbridge soils are deep, well drained, and medium textured. These soils formed in glacial till and in congeliturbate deposits derived from till that contain fragments of sandstone, shale, and limestone. Permeability is moderate in the surface layer and subsoil and is slow in the substratum. A water table commonly is perched above the substratum for very brief periods early in spring. These soils are on convex hilltops and side slopes.

Soils of minor extent are in the Howard, Lordstown, and Mardin series. Well drained and somewhat excessively drained, gravelly Howard soils are on benches and in rolling areas along the lower part of the valley sides. Well drained Lordstown soils are in a few areas where bedrock is within 40 inches of the surface. Mardin soils, which have a fragipan, are intermingled with the dominant soils in higher areas. Moderately steep Stockbridge soils are in a few areas on hillsides and valley sides.

This map unit is used mainly for hay and pasture and cultivated crops. Most crops are used in dairy farming. Most crops require liberal applications of lime and fertilizer. Some areas are idle or are in woodland. Slow permeability in the substratum and the presence of coarse fragments are limitations to the use of this map unit for some purposes. Some areas are used as campsites and as sites for other summertime recreational activities.

11. Stockbridge-Bath, moderately steep

Deep, well drained, medium textured soils that do not have a fragipan and deep, well drained, medium textured soils that have a fragipan; on uplands and valley sides

This map unit consists of moderately steep soils on glacial till plains on the upland plateau. The landscape consists mainly of the sides of valley walls and of elongated hills. Slopes range from 15 to 50 percent but are mostly 15 to 25 percent.

This map unit makes up about 0.8 percent of the county. Stockbridge soils make up about 60 percent of the unit, and Bath soils make up about 20 percent. Soils of minor extent make up the rest.

Stockbridge and Bath soils formed in glacial till deposits. Generally, the Stockbridge soils have limestone fragments and the Bath soils do not. Bath soils have a higher content of acid sandstone fragments than Stockbridge soils.

The Stockbridge soils are deep, well drained, and medium textured. They have a perched water table above the slowly permeable substratum for very brief periods early in spring. These moderately steep soils are mainly on slightly convex lower parts of valley sides and hillsides.

Bath soils are deep, well drained, and medium textured. These soils have a dense, slowly permeable fragipan at a depth of 26 to 36 inches that restricts root penetration. A perched water table is above the fragipan for brief periods in spring. Free water commonly moves across the top of the fragipan. These moderately steep and steep soils are mostly on convex upper parts of valley sides and hillsides.

Soils of minor extent are in the Howard, Lansing, and Lordstown series. Well drained and somewhat excessively drained, gravelly Howard soils are intermingled with the dominant soils on the lower part of valley walls. Well drained Lansing soils are in areas that have a higher content of limestone fragments than the dominant soils. Lordstown soils are in a few areas where bedrock is within 20 to 40 inches of the surface.

This map unit is used mainly for pasture and woodland. Many areas that previously were used for crops are idle and are reverting to brush and trees. Slope, hazard of

erosion, and slow permeability are the main limitations to the use of this map unit for most purposes. Some areas have potential for improvement of wildlife habitat or for some recreational activities, for example, skiing.

Deep soils that formed in glacial till and have a fragipan

The 4 map units in this group are in uplands, mainly at the higher elevations in the county. They make up about 28.1 percent of the land area in the county. The soils in this group formed in glacial till derived from siltstone, shale, and sandstone. They are dominantly deep. They are well drained to poorly drained and are medium textured. Most of the soils have a fragipan at a depth of 10 to 36 inches. The fragipan impedes drainage and rooting. The soils range from nearly level to steep but are dominantly gently sloping and sloping.

12. Bath, sloping

Deep, well drained, medium textured soils that have a fragipan; on uplands

This map unit consists of gently sloping and sloping soils on glacial till plains on the upland plateau. The landscape consists of hilltops and upper parts of hillsides at the higher elevations in the county. Slopes range from 3 to 15 percent but are dominantly 8 to 15 percent.

This map unit makes up about 3.4 percent of the county. About 65 percent of the unit is Bath soils, and the rest is soils of minor extent.

Bath soils are deep, well drained, medium textured soils that have a fragipan. They formed in glacial till deposits that have a high content of sandstone, siltstone, and shale fragments. The dense, slowly permeable fragipan at a depth of 26 to 36 inches impedes root penetration. These soils have a perched water table above the fragipan for brief periods in spring. They are on convex hilltops, hillsides, and upper parts of valley sides.

The soils of minor extent are in the Mardin, Volusia, and Lordstown series. The moderately well drained Mardin soils and the somewhat poorly drained Volusia soils are on lower side slopes, along field drainageways, and in other areas that receive runoff. Moderately deep Lordstown soils are on some hilltops and on a few moderately steep hillsides. A few areas of moderately steep Bath soils are also in this map unit.

This map unit is used mainly for pasture and hay and for woodland. It also is used for some crops, for example, corn, that are associated with dairy farming. Short season varieties must be selected, however, because of the high elevation. Most crops respond well to liberal applications of lime and fertilizer. Some areas that previously were cropped are idle or are reverting to forest. Slow permeability and the presence of coarse fragments are limitations to the use of this map unit for nonfarm purposes. Some areas have potential as campsites or as sites for other recreational activities.

13. Bath-Lordstown-Mardin, moderately steep

Deep, well drained and moderately well drained, medium textured soils that have a fragipan and moderately deep, well drained, medium textured soils; on uplands and valley sides

This map unit consists of moderately steep and steep soils on glacial till plains on the upland plateau. It is mostly on side slopes of valleys and on the sides of ridges and hills. Slopes range from 15 to 50 percent but are dominantly 15 to 25 percent.

This map unit makes up about 5.1 percent of the county. Bath soils make up about 40 percent of the unit, Lordstown soils make up about 30 percent, and Mardin soils make up about 20 percent. Soils of minor extent make up the rest.

Bath, Lordstown, and Mardin soils formed in glacial till deposits that contain fragments of siltstone, sandstone, and shale.

Bath soils are deep, well drained, and medium textured. These soils have a dense, slowly permeable fragipan at a depth of 26 to 36 inches that restricts root penetration. A perched water table is above the fragipan for brief periods in spring. The moderately steep and steep Bath soils are on convex hillsides and valley sides and are dissected by drainageways in many places.

Mardin soils are deep, moderately well drained, and medium textured. These soils have a dense, slowly permeable fragipan at a depth of 14 to 25 inches that restricts root penetration. A perched water table is above the fragipan for brief periods in spring. The moderately steep Mardin soils are on convex hillsides and valley sides and are dissected by drainageways in many places.

Lordstown soils are moderately deep, well drained, and medium textured. Bedrock is at a depth of 20 to 40 inches and is mainly siltstone, sandstone, and shale. These moderately steep soils are on valley sides and sides of ridges. They commonly are lower on the landscape than Bath soils and higher than Mardin soils.

Soils of minor extent are in the Arnot, Volusia, and Stockbridge series. Arnot soils are in areas where bedrock is at a depth of 10 to 20 inches. Somewhat poorly drained Volusia soils are on foot slopes and receive runoff from higher soils. Deep, well drained Stockbridge soils, which do not have a fragipan, are in some areas. Alluvial land along a few dissecting drainageways is also in this map unit.

This map unit is used mainly for woodland. Some areas are used for pasture and hay crops or are idle. Slope, the slowly permeable fragipan in some of the soils and moderate depth to bedrock in some of the soils are the main limitations to the use of this map unit. Some areas have potential for development of wildlife habitat, and some areas have potential for some recreational developments, for example, ski slopes.

14. Mardin-Volusia, sloping

Deep, moderately well drained and somewhat poorly drained, medium textured soils that have a fragipan; on uplands

This map unit consists of nearly level to sloping soils on glacial till plains. The landscape consists dominantly of broad divides and of hilltops, hillsides, and ridges on the upland plateau. Slopes range from 3 to 15 percent but are mainly 8 to 15 percent.

This map unit makes up 17.6 percent of the county. It is the most extensive map unit in the county. Mardin soils make up about 55 percent of the unit, and Volusia soils make up 25 percent. Soils of minor extent make up the rest.

Mardin and Volusia soils formed in similar glacial till deposits derived mainly from local siltstone, sandstone, and shale (fig. 2).

Mardin soils are deep, moderately well drained, and medium textured. A dense, slowly permeable and very slowly permeable fragipan is at a depth of 14 to 25 inches. Permeability is moderate above the fragipan. These gently sloping and sloping soils are on broad, convex landforms. A small amount of runoff accumulates on these soils.

Volusia soils are deep, somewhat poorly drained, and dominantly medium textured. A slowly permeable and very slowly permeable fragipan is at a depth of 10 to 20 inches. It causes a perched seasonal high water table in spring. These nearly level to sloping soils are in flats where runoff is slow and on concave foot slopes where runoff accumulates.

Soils of minor extent are in the Bath, Stockbridge, Lordstown, and Chippewa series. Well drained Bath soils are on a few slightly elevated knolls. Well drained Stockbridge soils, which do not have a fragipan, are along some valley sides. Lordstown soils are in places, mainly on hilltops, where bedrock is within 20 to 40 inches of the surface. Poorly drained Chippewa soils are in a few small depressions and along some drainageways. Alluvial land along a few streams is also in this map unit.

This map unit is used for hay and pasture crops and woodland and for some crops associated with dairy farming. Many areas that previously were cropped are reverting to brush and trees. Because this map unit is at a relatively high elevation, short season crop varieties commonly are required. Seasonal wetness and slow or very slow permeability in the fragipan are the primary limitations to the use of this map unit. Some areas have potential as sites for recreational developments, for example, campsites, trails, and ponds.

15. Volusia-Chippewa, nearly level

Deep, somewhat poorly drained and poorly drained, medium textured soils that have a fragipan; on uplands

This map unit consists of nearly level and gently sloping soils on glacial till plains on the upland plateau. The landscape consists of flats on broad hilltops and of low areas between hills. Slopes range from 0 to 8 percent but are mostly 0 to 3 percent.

This map unit makes up about 2.0 percent of the county. About 40 percent of the unit is Volusia soils, and 35 percent is Chippewa soils. The rest is soils of minor extent.

Volusia and Chippewa soils formed in similar glacial till deposits derived from local siltstone, sandstone, and shale.

Volusia soils are deep, somewhat poorly drained, and dominantly medium textured. In spring a seasonal high water table is perched above the slowly permeable or very slowly permeable fragipan that is at a depth of 10 to 20 inches. These nearly level and gently sloping soils are in flats and on concave foot slopes. Runoff accumulates on these soils.

Chippewa soils are deep, poorly drained, and medium textured. For long periods in spring, a perched water table is above the dense, very slowly permeable fragipan that is at a depth of 10 to 15 inches. These nearly level soils are in depressions and in low areas along drainageways. They generally are slightly lower on the landscape than adjacent areas of Volusia soils.

Soils of minor extent are in the Mardin, Alden, and Tuller series. Moderately well drained Mardin soils are on slight rises and in areas that receive little runoff. Very poorly drained Alden soils are in deep depressions that have a silty mantle of local colluvium. Somewhat poorly drained and poorly drained Tuller soils are in some flats where bedrock is within 20 inches of the surface. Sloping Volusia soils are along the fringe of some areas of this map unit.

This map unit is used for permanent pasture and woodland. Many areas that previously were cleared for farming have reverted to brush. A few areas are artificially drained and are used for crops. Wetness and slow or very slow permeability in the fragipan generally are the main limitations to the use of this map unit. Some areas have potential for development of wetland wildlife habitat or as sites for recreational ponds.

Moderately deep and shallow soils that formed in glacial till

The 7 map units in this group are mainly in the uplands and on valley sides. They make up about 14.2 percent of the county. The soils in this group formed largely in glacial till and in residuum, or frost-fractured material, derived from the underlying bedrock. The soils are mainly moderately deep and shallow, somewhat excessively drained to somewhat poorly drained, and medium textured or moderately fine textured. They are mainly 10 to 40 inches deep to bedrock. They range from nearly level to very steep, but they are dominantly gently sloping to steep.

16. Aurora, sloping

Moderately deep, moderately well drained, medium textured soils; on uplands

This map unit consists of gently sloping and sloping soils on glacial till plains on the upland plateau. It is on bedrock-controlled hilltops and commonly is on north-facing hillsides. Slopes range from 3 to 15 percent but are mainly 8 to 15 percent.

This map unit makes up 1.1 percent of the county. About 65 percent of the unit is Aurora soils, and the rest is soils of minor extent.

Aurora soils formed in a thin mantle of shaly glacial till and in frost-fractured material derived from the underlying shale bedrock. They are moderately deep and moderately well drained. They have a medium textured surface layer and a medium textured and moderately fine textured subsoil and substratum. The underlying bedrock is at a depth of 20 to 40 inches. A temporary seasonal high water table is perched above the bedrock early in spring. Permeability is slow in the subsoil and substratum. These soils are on convex hilltops and hillsides.

Soils of minor extent are mainly in the Lansing, Lordstown, Wassaic, and Angola series. The well drained Lansing soils are slightly higher on the landscape than Aurora soils and are deep to bedrock. Well drained Lordstown soils are in a few areas and overlie fractured siltstone or sandstone bedrock. Well drained Wassaic soils are on high knolls and in a few small areas that are underlain by limestone. The somewhat poorly drained Angola soils are in small, nearly level areas. Moderately steep Aurora soils are also in this map unit.

This map unit is used mainly for hay and pasture crops and for woodland. A few areas are used for crops. Most crops are used in dairying. Moderate depth to bedrock and slow permeability are the main limitations to most uses of this map unit. Some areas have potential as shale quarries or for some recreational developments.

17. Lairdsville-Camillus-Lockport, gently sloping

Moderately deep, well drained to somewhat poorly drained, medium textured and moderately fine textured soils; on uplands and in islandlike areas on the lake plain

This map unit consists of nearly level to sloping soils on glacial till plains. The landscape consists of broad, bedrock-controlled hills on the upland plateau and low, bedrock-controlled rises on the lake plain. Slopes range from 0 to 15 percent but are dominantly 3 to 8 percent.

This map unit makes up 2.0 percent of the county. Lairdsville soils make up about 50 percent of the unit, Camillus soils make up about 15 percent, and Lockport soils make up about 15 percent. Soils of minor extent make up the rest.

Lairdsville, Camillus, and Lockport soils are 20 to 40 inches deep to soft, decomposing shale bedrock. These soils formed in glacial till deposits that are mixed with residuum from the underlying shale.

Lairdsville soils are moderately well drained and well drained. They have a medium textured and moderately fine textured surface layer and dominantly have a fine textured and moderately fine textured subsoil. A seasonal high water table generally is perched above the substratum or the bedrock early in spring. These gently sloping and sloping soils are on broad, convex rises, hilltops, and hillsides (fig. 3).

Camillus soils are well drained and moderately well drained and are medium textured. In some years a temporary seasonal high water table is perched above the bedrock for very brief periods early in spring, especially in gently sloping areas. These gently sloping and sloping soils are on convex hilltops and hillsides.

Lockport soils are somewhat poorly drained. They have a medium textured surface layer and a moderately fine textured and fine textured subsoil. A perched seasonal high water table is in the upper part of the subsoil in spring. These nearly level and gently sloping soils are in low flats and on concave foot slopes.

Soils of minor extent are in the Ovid, Cazenovia, and Odessa series. Somewhat poorly drained to moderately well drained Ovid soils are in low areas and are more than 40 inches deep to bedrock. Deep, moderately well drained and well drained Cazenovia soils are on a few knolls and rises. Somewhat poorly drained Odessa soils are in a few areas that have deep lacustrine deposits.

This map unit is used for hay and and pasture crops and woodland. Some areas are used for crops associated with dairying. The soils in this map unit are easily eroded and should be protected by a maximum of conservation practices. Moderate depth to soft shale bedrock and seasonal wetness in some areas are the main limitations to most uses of this map unit.

18. Lairdsville-Schoharie-Cazenovia, steep

Moderately deep and deep, well drained and moderately well drained, moderately fine textured soils; on valley sides and uplands

This map unit consists of moderately steep and steep soils on the northern edge of the upland plateau and on the sides of some major valleys that dissect the plateau. Slopes range from 15 to 50 percent but are mainly less than 35 percent.

This map unit makes up about 1.6 percent of the county. About 30 percent of the unit is Lairdsville soils, about 20 percent is Schoharie soils, and 20 percent is Cazenovia soils. The rest is soils of minor extent.

Lairdsville soils formed in glacial till that is mixed with residuum weathered from the underlying shale bedrock. These soils are moderately well drained and well drained. They have a moderately fine textured surface layer and a fine textured and moderately fine textured subsoil. Soft shale bedrock is at a depth of 20 to 40 inches. Free water commonly moves downslope across the top of the bedrock for brief periods in spring. These moderately steep and steep soils are on valley sides and on escarpmentlike fronts.

Schoharie soils formed in reddish lacustrine sediment. These soils are deep and are moderately well drained and well drained. They have a moderately fine textured surface layer and a moderately fine textured and fine textured subsoil. A temporary seasonal high water table commonly is above the substratum early in spring. These hilly and steep soils are on the lower part of valley sides and commonly are slightly lower on the landscape than the adjacent Lairdsville soils.

Cazenovia soils formed in glacial till that commonly is mixed with reddish lacustrine sediment. These soils are deep and are well drained and moderately well drained. They are medium textured and moderately fine textured. In some years a temporary seasonal high water table is perched above the slowly permeable substratum early in spring. These moderately steep and steep soils are on the upper part of valley sides, where they commonly are slightly higher than adjacent Lairdsville soils, and on the lower part of valley sides, where they are closely intermingled wih Schoharie soils.

Soils of minor extent are mainly in the Honeoye, Palmyra, Farmington, and Ovid series. Well drained Honeoye soils are in areas where the subsoil has a lower clay content than the dominant soils. Gravelly Palmyra soils are in areas where the deposits are mainly glacial outwash. Shallow Farmington soils are in a few areas where limestone bedrock is close to the surface. Deep, somewhat poorly drained and moderately well drained Ovid soils are on some foot slopes. Some areas of severely eroded soils that are dissected by deep gullies are also in this map unit.

This map unit is used mainly for trees or permanent pasture or is idle. The hazard of erosion is severe, and a thick cover of vegetation is needed to protect the soil. Slope is the principal limitation to the use of this map unit. Most areas have potential for use as naturally wooded open space corridors or for development of wildlife habitat.

19. Lordstown, sloping

Moderately deep, well drained, medium textured soils; on uplands

This map unit consists of gently sloping and sloping soils on glacial till plains on the upland plateau. The landscape consists mainly of the tops and sides of bedrock-controlled hills at higher elevations in the county. Slopes range from 3 to 15 percent but are mostly 8 to 15 percent.

This map unit makes up 6.2 percent of the county. Lordstown soils make up about 65 percent of the unit, and soils of minor extent make up the rest.

Lordstown soils formed in a thin mantle of glacial till that commonly is mixed with frost-fractured material derived from the underlying bedrock. These soils are well drained and are medium textured. They are 20 to 40 inches deep to sandstone, siltstone, or shale bedrock. Permeability throughout the soil is moderate. These soils generally do not have a seasonal high water table. They are on convex hilltops and hillsides.

Soils of minor extent are mainly in the Arnot, Tuller, Mardin, and Bath series. Shallow Arnot soils are in areas where bedrock is within a depth of 10 to 20 inches. Shallow, somewhat poorly drained and poorly drained Tuller soils are in nearly level areas and on concave foot slopes. Moderately well drained Mardin soils and well drained Bath soils are in a few areas where the soil mantle is more than 40 inches thick and where a fragipan has formed. Moderately steep Lordstown soils are on some side slopes. A few small outcrops of bedrock are also in this map unit.

This map unit is used mainly for woodland and for pasture and hay crops. A few areas are used for cultivated crops. Short season varieties of crops should be selected because of the relatively short growing season. Moderate soil depth to bedrock and the presence of coarse fragments are limitations to most uses of this map unit. Some areas have a scenic view and have potential for some recreational activities, for example, picnicking, hiking, and camping.

20. Lordstown-Arnot, steep

Moderately deep and shallow, somewhat excessively drained to moderately well drained, medium textured soils; on valley sides

This map unit consists of steep and very steep soils on glacial till plains on the dissected upland plateau. The landscape consists mainly of valley sides. Slopes range from 25 to 70 percent but are mainly less than 35 percent.

This map unit makes up about 1.5 percent of the county. Lordstown soils make up about 45 percent of the unit, and Arnot soils make up about 35 percent. Soils of minor extent make up the rest.

Lordstown and Arnot soils formed in a thin mantle of glacial till that commonly is mixed with frost-fractured material derived from the underlying siltstone, sandstone, or shale bedrock.

Lordstown soils are well drained and medium textured and are 20 to 40 inches deep to bedrock. These soils generally do not have a seasonal high water table, but some free water moves downslope across the top of the bedrock early in spring. Permeability is moderate in the soil mantle. These soils are on valley sides and are closely intermingled with Arnot soils.

Arnot soils are somewhat excessively drained to moderately well drained and are medium textured. These soils are 10 to 20 inches deep to bedrock. Early in spring, a temporary seasonal high water table is perched above the bedrock in places where the rock is poorly jointed. These soils are on valley sides that commonly have a stairstep appearance because the underlying bedrock is in ledges.

Soils of minor extent are mainly in the Bath, Mardin, and Aurora series. The well drained Bath soils and moderately well drained Mardin soils are in places where

bedrock is at a depth of more than 40 inches. They commonly are on the upper part of valley sides. Moderately well drained Aurora soils are in areas where dark shale bedrock is dominant. Moderately steep Lordstown soils are on the upper part of a few valley sides. A few very steep areas of rock outcrops and some seep spots are also in this map unit.

This map unit is used mainly for woodland. A few areas are used for pasture that generally is poor in quality. Steepness of slopes is the primary limitation to the use of this map unit. Some areas have potential for improvement of wildlife habitat or for some recreational developments, for example, ski slopes.

21. Wassaic, gently sloping

Moderately deep, well drained and moderately well drained, medium textured soils; on uplands

This map unit consists of nearly level to sloping soils on glacial till plains on the upland plateau and in a few small islandlike areas on the lake plain. The appearance of the landscape is controlled by the underlying bedrock. In some areas the landscape has a stairstep appearance because the bedrock is ledged. Slopes range from 0 to 15 percent but are mainly 3 to 8 percent.

This map unit makes up 0.9 percent of the county. About 65 percent of the unit is Wassaic soils, and the rest is soils of minor extent.

Wassaic soils formed in a thin mantle of glacial till. These soils are well drained and moderately well drained and are 20 to 40 inches deep to limestone bedrock. The surface layer is medium textured, and the subsoil is medium textured and moderately fine textured. A seasonal high water table is perched above the bedrock for very brief periods in spring. These soils are on convex slopes that have short, sharp breaks related to the underlying bedrock.

Soils of minor extent are in the Angola, Aurora, Farmington, and Honeoye series. Somewhat poorly drained Angola soils are in nearly level areas and slight depressions. Moderately well drained Aurora soils, which are underlain by dark shale bedrock, are in a few areas. Farmington soils are in places where bedrock is at a depth of 10 to 20 inches. Well drained Honeoye soils are in places where bedrock is at a depth of more than 40 inches. Small ledges of rock outcrop are in a few areas of this map unit.

This map unit is used for cultivated crops and hay and pasture crops. A few areas are wooded. Moderate depth to hard bedrock is the principal limitation to most uses of this map unit. Ground water pollution from septic effluent and other waste is a hazard. Some areas have potential for recreational development.

22. Wassaic-Farmington, sloping

Moderately deep and shallow, well drained and moderately well drained, medium textured soils; on uplands

This map unit consists of gently sloping and sloping soils on glacial till plains on the low upland plateau. The appearance of the landscape closely parallels the ledged contour of the underlying bedrock. Many areas have a stairstep appearance. Slopes range from 3 to 15 percent but are mainly 8 to 15 percent.

This map unit makes up 0.9 percent of the county. Wassaic soils make up about 40 percent of the unit, and Farmington soils make up about 35 percent. Soils of minor extent make up the rest.

Wassaic and Farmington soils formed in a similar thin mantle of glacial till.

Wassaic soils are well drained and moderately well drained and are 20 to 40 inches deep to limestone bedrock. The surface layer is medium textured, and the subsoil is medium textured and moderately fine textured. Permeability is moderate and moderately slow in the subsoil. A seasonal high water table is perched above the bedrock for very brief periods early in spring. These sloping soils are on low hills, escarpmentlike fronts, and the upper part of valley sides.

Farmington soils are well drained and medium textured and are 10 to 20 inches deep to bedrock that is mainly limestone. Permeability is moderate throughout the soil mantle. These gently sloping and sloping soils are on short, escarpmentlike fronts and on the tops of hills and escarpments.

Soils of minor extent are mainly in the Lima, Honeoye, and Aurora series. Deep, moderately well drained Lima soils are in some areas that are very stony. Well drained Honeoye soils are in areas where bedrock is at a depth of more than 40 inches. Moderately well drained Aurora soils are in areas where the bedrock is dominantly dark shale. Gently sloping Wassaic soils are in a few areas. Rock outcrops and soils that are less than 10 inches deep to bedrock are also in some areas of this map unit, especially where the landscape has a stairstep appearance.

This map unit is mainly in woodland, brush, and permanent pastureland. A few areas are suitable for crops. Depth to bedrock, slope, and droughtiness in some areas are the main limitations to the use of this map unit. Some areas have a scenic view and have potential for hiking and picnicking. Some areas have potential as limestone quarries.

Deep soils that formed in glaciolacustrine deposits

The 9 map units in this group are mainly on the lake plain. They also are in some of the major valleys. These map units make up about 8.7 percent of the land area in the county. The soils in this group formed mainly in lake-laid deposits that contain silt, clay, or sand and are free of coarse fragments. They are deep and are excessively drained to very poorly drained. They are dominantly moderately coarse textured to moderately fine textured. They range from nearly level to steep but are dominantly nearly level or undulating.

23. Colonie-Arkport-Elnora, undulating

Deep, excessively drained to moderately well drained, coarse textured and moderately coarse textured soils; on lake plains

This map unit consists of nearly level to rolling soils that are mainly on glacial lake plains. A few small areas are in valleys. The landscape is mainly broad, raised benches and ridges. Slopes range from 0 to 15 percent but are mostly 0 to 8 percent.

This map unit makes up 0.7 percent of the county. Colonie soils make up about 50 percent of the unit, Arkport soils make up about 20 percent, and Elnora soils make up about 20 percent. Soils of minor extent make up the rest.

Colonie, Arkport, and Elnora soils formed in glaciofluvial (stream-laid), glaciolacustrine (lake-laid), and eolian (wind-laid) deposits that are dominantly fine sand.

Colonie soils are deep, excessively drained to well drained, and coarse textured. Permeability is rapid throughout the soil. These nearly level and undulating soils are on the tops and sides of ridges and on broad, terracelike benches.

Arkport soils are deep and well drained. The surface layer is moderately coarse textured. The subsoil is dominantly coarse textured and moderately coarse textured and has thin horizontal bands that are slightly finer textured (fig. 4). Permeability is moderately rapid. These undulating and rolling soils are on ridges, knolls, and low hills that have complex slopes.

Elnora soils are deep, moderately well drained, and coarse textured. A temporary seasonal high water table is in the lower part of the subsoil for part of the spring. These nearly level soils are on low benches and in areas between ridges and knolls.

Soils of minor extent are in the Galen, Minoa, and Naumburg series. Moderately well drained Galen soils are adjacent to Arkport soils and are slightly lower on the landscape than those soils. Somewhat poorly drained Minoa soils are along some drainageways and in a few basins between knolls. Somewhat poorly drained and poorly drained, nearly level Naumburg soils are in a few slight depressions.

This map unit is used mainly for vegetable crops and other crops. A few areas are idle and are used for pasture or woodland. Early truck crops and garden crops generally grow well on the soils in this map unit if ample amounts of fertilizer and lime are applied. Droughtiness is a problem in midsummer, especially if shallow-rooted plants are grown. These soils are suitable for residential development, except temporary wetness is a limitation to use of some of the soils for this purpose.

24. Fonda-Canandaigua, nearly level

Deep, very poorly drained and poorly drained, medium textured soils; on the lake plain

This map unit consists of nearly level soils on the glacial lake plain. It is in low depressional areas. Slopes range from 0 to 3 percent but are mostly less than 2 percent.

This map unit makes up about 0.6 percent of the county. About 40 percent of the unit is Fonda soils, and about 30 percent is Canandaigua soils. The rest is soils of minor extent.

Fonda and Canandaigua soils formed in glaciolacustrine (lake-laid) sediment dominated by clay and silt.

Fonda soils are deep and very poorly drained. The surface layer is medium textured, and the subsoil is moderately fine textured and fine textured. A high water table is at or near the surface for long periods during the year. These soils are in nearly level and concave, depressional, basinlike areas.

Canandaigua soils are deep and are poorly drained and very poorly drained. The surface layer is medium textured, and the subsoil is medium textured and moderately fine textured. A high water table is near the surface in spring and during periods of heavy rain. These soils are in low areas and slight depressions and commonly are slightly higher than the adjacent Fonda soils.

Soils of minor extent are in the Alden, Lakemont, and Odessa series. Very poorly drained Alden soils are in places where the lacustrine mantle is thin and overlies glacial till. Lakemont soils are similar to Fonda soils but are slightly better drained. Somewhat poorly drained Odessa soils are in some nearly level areas that are not depressions. A few small, deep potholes of marsh are also in this map unit.

Most of this map unit is idle or is in water-tolerant trees or poor quality pasture. A few areas are artificially drained and are used for crops. Prolonged wetness is the principal limitation to the use of this map unit. Drainage outlets commonly are difficult to locate. Some areas have potential for development of wildlife marshes.

25. Galen-Elmwood, nearly level

Deep, moderately well drained, medium textured and moderately coarse textured soils; on the lake plain

This map unit consists of nearly level and gently sloping soils on the glacial lake plain. The landscape is low, broad benches and ridges that are remnants of deltas, sandbars, and beaches. Slopes range from 0 to 8 percent but are mainly 0 to 3 percent.

This map unit makes up about 0.5 percent of the county. About 45 percent of the unit is Galen soils, and about 30 percent is Elmwood soils. The rest is soils of minor extent.

Galen and Elmwood soils formed in glaciofluvial (stream-laid) and glaciolacustrine (lake-laid) deposits that are mainly fine sand or very fine sand. Elmwood soils are underlain by glaciolacustrine clay and silt at a depth of 20 to 40 inches.

Galen soils are deep and are moderately well drained. The surface layer is medium textured, and the subsoil is

coarse textured to medium textured. The subsoil has thin horizontal bands that are slightly finer in texture than the surrounding soil material. A temporary seasonal high water table is in the subsoil early in spring. These soils are on low, slightly convex benches and on the lower sides of ridges.

Elmwood soils are deep and are moderately well drained. The surface layer and subsoil are dominantly moderately coarse textured, and the substratum is fine textured and moderately fine textured. A temporary seasonal high water table is perched above the very slowly permeable substratum early in spring. These soils are on low, slightly convex benches and ridges.

Soils of minor extent are in the Minoa, Swanton, Arkport, and Teel series. The somewhat poorly drained Minoa soils are in low areas adjacent to Galen soils. Poorly drained and somewhat poorly drained Swanton soils are in low areas and drainageways adjacent to Elmwood soils. Well drained Arkport soils are on a few knolls and ridges and are slightly higher on the landscape than the dominant soils. Teel soils are on alluvial flood plains along a few streams that dissect this map unit in some places.

This map unit is used for row crops and vegetable crops. Some areas are used for pasture and woodland. Some areas that are near urban centers are idle. Temporary seasonal wetness and very slow permeability in the substratum in some areas are the principal limitations to the use of this map unit.

26. Lamson-Raynham-Minoa, nearly level

Deep, somewhat poorly drained to very poorly drained, medium textured soils; on the lake plain

This map unit consists of nearly level soils on the Oneida Lake Plain. The landscape is broad, low flats and slight depressions. Slopes range from 0 to 3 percent.

This map unit makes up about 1.6 percent of the county. Lamson soils make up about 30 percent of the unit, Raynham soils make up about 25 percent, and Minoa soils make up 15 percent. Soils of minor extent make up the rest.

Lamson, Raynham, and Minoa soils formed in glaciolacustrine (lake-laid) sediment dominated by very fine sand, fine sand, and coarse silt.

Lamson soils are deep and are poorly drained and very poorly drained. These soils are free of coarse fragments. The surface layer is medium textured, and the subsoil is medium textured and moderately coarse textured. A high water table is at or near the surface for long periods. These soils are in depressions. Slopes are mostly less than 2 percent.

Raynham soils are deep, somewhat poorly drained and poorly drained, and medium textured. A seasonal high water table is in the upper part of the subsoil in spring. These soils are in low, nearly level areas.

Minoa soils are deep and are somewhat poorly drained. The surface layer is medium textured, and the subsoil is dominantly moderately coarse textured and coarse textured. A seasonal high water table is in the upper part of the subsoil early in spring. These soils are in moderately low, slightly convex areas. They generally are slightly higher on the landscape than Lamson soils. In some places they surround areas of Lamson soils. Soils of minor extent are in the Wareham, Naumburg, Niagara, and Wayland series. Poorly drained Wareham soils and somewhat poorly drained and poorly drained Naumburg soils are in a few large areas in the town of Sullivan. These soils are sandier in texture than the dominant soils of the unit. Somewhat poorly drained Niagara soils are in a few areas that have a higher content of clay in the subsoil than the dominant soils. Wayland soils are on narrow flood plains along a few streams that cross this map unit in places.

Most of this map unit is in native species of water-tolerant trees or is idle. A few areas are artificially drained and are used for cultivated crops. Wetness is the main limitation to most uses of this map unit. Sidewalls of excavations for underground utilities are unstable. Some areas have potential for development of wetland wildlife habitat.

27. Minoa-Swanton, nearly level

Deep, somewhat poorly drained and poorly drained, medium textured and moderately coarse textured soils; on the lake plain

This map unit consists of nearly level soils in moderately low areas on the lake plain. Slopes range from 0 to 3 percent.

This map unit makes up about 0.7 percent of the county. About 40 percent of the unit is Minoa soils, and 25 percent is Swanton soils. Soils of minor extent make up the rest.

Minoa and Swanton soils formed in glaciolacustrine (lake-laid) and glaciofluvial (stream-laid) deposits that are mainly fine sand and very fine sand. The Swanton soils are underlain by clay and silt at a depth of 20 to 40 inches.

Minoa soils are deep and are somewhat poorly drained. The surface layer is medium textured, and the subsoil is dominantly moderately coarse textured and coarse textured. A seasonal high water table is in the upper part of the subsoil early in spring. These soils are in broad, nearly level areas.

Swanton soils are deep and are poorly drained and somewhat poorly drained. The surface layer and subsoil are dominantly moderately coarse textured, and the substratum is moderately fine textured and fine textured. A seasonal high water table is in the upper part of the subsoil in spring. These soils are in nearly level areas and commonly are slightly lower on the landscape than the adjacent Minoa soils.

Soils of minor extent are in the Elmwood, Galen, Niagara, Lamson, and Wayland series. Moderately well drained Elmwood and Galen soils are on a few rises and knolls that are surrounded by areas of the dominant soils.

Niagara soils are in some areas where the content of silt and clay is higher than that of the major soils. Poorly drained and very poorly drained Lamson soils are in a few depressions. Wayland soils are on low, narrow flood plains along a few streams that cross this map unit in places.

Most of this map unit is wooded or is idle. A few areas are artificially drained and are used for crops or hay. Seasonal wetness is the main limitation to the use of this map unit. During excavations for underground utilities, sidewalls of cuts generally are unstable.

28. Niagara-Canandaigua, nearly level

Deep, somewhat poorly drained to very poorly drained, medium textured soils; on the lake plain

This map unit consists of nearly level and gently sloping soils on the glacial lake plain. The landscape is dominantly broad flats and depressions. Slopes range from 0 to 8 percent but are dominantly 0 to 3 percent.

This map unit makes up about 2.1 percent of the county. About 50 percent of the unit is Niagara soils, and 35 percent is Canandaigua soils. The rest is soils of minor extent.

Niagara and Canandaigua soils formed in similar glaciolacustrine (lake-laid) deposits that are mainly silt and that have a small amount of clay.

Niagara soils are deep and are somewhat poorly drained. These soils have a medium textured surface layer and a medium textured and moderately fine textured subsoil. A seasonal high water table is in the upper part of the subsoil in spring. These nearly level and gently sloping soils are in moderately low flats and on concave foot slopes and gentle rises.

Canandaigua soils are deep and are poorly drained and very poorly drained. These soils have a medium textured surface layer and a medium textured and moderately fine textured subsoil. A high water table is at or near the surface for prolonged periods throughout the year. These nearly level soils are in slight depressions and commonly are surrounded by areas of Niagara soils.

Soils of minor extent are in the Collamer, Odessa, Lyons, and Teel series. Moderately well drained Collamer soils are on a few small convex knolls and ridges. Somewhat poorly drained Odessa soils are in a few areas that have a higher clay content than the dominant soils. Lyons soils are in some depressions that contain glacial till deposits. Moderately well drained and somewhat poorly drained Teel soils are on narrow flood plains of a few streams that cross this map unit in places.

Most of this map unit is in pasture, woodland, or hayland. Many areas that previously were cultivated are idle. A few areas are artificially drained and are used for cultivated crops. Wetness and moderately slow permeability are the main limitations to most uses of this map unit. Some areas near urban centers have potential as open space corridors.

29. Odessa-Lakemont, nearly level

Deep, somewhat poorly drained to very poorly drained, medium textured soils; on the lake plain

This map unit consists of nearly level soils on the lake plain. It is in broad, moderately low flats and in slight depressions. Slopes range from 0 to 3 percent.

This map unit makes up about 1.2 percent of the county. Odessa soils make up about 60 percent of the unit, and Lakemont soils make up about 25 percent. The rest is soils of minor extent.

Odessa and Lakemont soils formed in similar glaciolacustrine (lake-laid) deposits dominated by clay and silt.

Odessa soils are deep and are somewhat poorly drained. They have a medium textured surface layer and a fine textured and moderately fine textured subsoil. A seasonal high water table is perched above the slowly permeable or very slowly permeable subsoil and substratum early in spring. These soils are in broad flats.

Lakemont soils are deep and are poorly drained and very poorly drained. They have a medium textured surface layer and a fine textured and moderately fine textured subsoil. A seasonal high water table is near the surface for long periods in spring. Permeability is very slow in the subsoil and substratum. These nearly level soils are in slight depressions and low flats.

Soils of minor extent are in the Niagara, Fonda, and Schoharie series. Somewhat poorly drained Niagara soils are in a few areas and are slightly coarser textured than the major soils. Very poorly drained Fonda soils are in depressions and potholes that have a mucky surface layer. Moderately well drained and well drained Schoharie soils are on a few small convex knolls and ridges.

This map unit is mainly in water-tolerant species of pasture and hay plants and in trees. A few large areas are idle and are reverting to brush. Some areas are partially drained and are used for cultivated crops, for example, corn. Wetness and very slow permeability in the subsoil and substratum are the main limitations to most uses of this map unit. Some areas have potential as sites for dugout ponds or for improvement of wetland wildlife habitat.

30. Schoharie-Collamer, gently sloping

Deep, moderately well drained and well drained, medium textured and moderately fine textured soils; in valleys and on the lake plain

This map unit consists of nearly level to rolling soils on the glacial lake plain and in some of the major valleys. The landscape is dominantly raised benches and low ridges and knolls. Slopes range from 0 to 15 percent but are mainly 3 to 8 percent.

This map unit makes up about 0.8 percent of the county, Schoharie soils make up about 45 percent of the unit, and Collamer soils make up about 40 percent. Soils of minor extent make up the rest.

Schoharie and Collamer soils formed in glaciolacustrine (lake-laid) sediment dominated by silt and clay.

Schoharie soils are deep and are moderately well drained and well drained. They have a medium textured and moderately fine textured surface layer and a fine textured and moderately fine textured subsoil. A temporary seasonal high water table is in the lower part of the subsoil early in spring. It commonly is perched above the very slowly permeable substratum and subsoil. These gently sloping and rolling soils are on convex knolls, ridges, and benches.

Collamer soils are deep and are moderately well drained. They have a medium textured surface layer and a medium textured and moderately fine textured subsoil. A temporary seasonal high water table is in the lower part of the subsoil early in spring. These nearly level to rolling soils are on benches and knolls that have complex slopes, and they commonly are intermingled with Schoharie soils.

Soils of minor extent are in the Arkport, Odessa, and Cazenovia series. The well drained Arkport soils are in a few areas where the surface layer is mainly very fine sand and fine sand. Somewhat poorly drained Odessa soils are on a few foot slopes and in a few drainageways (fig. 5). Cazenovia soils are in a few areas that contain glacial till deposits.

This map unit is used for cultivated crops, and hay and pasture crops. Some areas are suited to vegetable crops. In cultivated areas, the hazard of erosion is severe and careful management and use of intensive conservation measures are required. Temporary seasonal wetness, instability, and moderately slow to very slow permeability are the main limitations to most uses of this map unit.

31. Schoharie-Collamer, hilly

Deep, well drained and moderately well drained, moderately fine textured and medium textured soils; in valleys and on the lake plain

This map unit consists of hilly and steep soils in major valleys and in a few areas on the glacial lake plain. The landscape is mainly a series of hills and ridges that have short, complex slopes. Slopes range from 15 to 50 percent but are mainly less than 25 percent.

This map unit makes up about 0.5 percent of the county. Schoharie soils make up about 50 percent of the unit, and Collamer soils make up about 20 percent. Soils of minor extent make up the rest.

Schoharie and Collamer soils formed in glaciolacustrine (lake-laid) sediment that consists mainly of silt and clay.

The Schoharie soils are deep and are well drained and moderately well drained. They have a moderately fine textured surface layer and a fine textured and moderately fine textured subsoil. Most areas of these soils are severely eroded. A seasonal high water table occasionally is perched above the substratum for very brief periods early in spring. These hilly and steep soils generally are on convex hills that have short, complex slopes.

Collamer soils are deep and are moderately well drained. They have a medium textured surface layer and a medium textured and moderately fine textured subsoil. A temporary seasonal high water table is in the lower part of the subsoil early in spring. These hilly soils are on hills that have short, convex slopes, and they generally are closely intermingled with the Schoharie soils.

Soils of minor extent are mainly in the Cazenovia, Arkport, Niagara, and Wayland series. Well drained and moderately well drained Cazenovia soils are in areas that contain glacial till deposits. Well drained Arkport soils are in areas where the deposits are mainly sandy. Somewhat poorly drained Niagara soils are on foot slopes between hills. Wayland soils are on narrow flood plains of a few streams that cross this map unit in places. Rolling Schoharie and Collamer soils are also in this map unit.

This map unit is mostly in pastureland and woodland. It is not suited to cultivated crops but is suited to hay crops in some areas. The hazard of erosion is severe if the plant cover is removed. Slope and the instability of the soil material are the main limitations to most uses of this map unit. If excavations or cuts are made at the top of slopes, there is a hazard of mass slumps or slides.

Deep soils that formed in glaciofluvial deposits

The 5 map units in this group are mainly in valleys. They are also in small islandlike areas on the lake plain. They make up about 10.9 percent of the county. The soils in this group formed mainly in stream-laid deposits that have a high content of sand and gravel. They are deep and are somewhat excessively drained to very poorly drained. They are dominantly medium textured and moderately coarse textured. The substratum in these soils is mainly coarse textured. These soils range from nearly level to steep but are mainly undulating and nearly level.

32. Fredon-Halsey, nearly level

Deep, somewhat poorly drained to very poorly drained, medium textured soils; in valleys and islandlike areas on the lake plain

This map unit consists of nearly level soils on glacial outwash plains and terraces in major valleys and in islandlike areas on the lake plain. The landscape is mainly low benches, flats, and depressions. Slopes range from 0 to 3 percent.

This map unit makes up about 1.1 percent of the county. Fredon soils make up about 50 percent of the unit, and Halsey soils make up about 20 percent. Soils of minor extent make up the rest.

Fredon and Halsey soils formed in similar glaciofluvial (stream-laid) deposits that have a high content of gravel and sand.

Fredon soils are deep and are somewhat poorly drained and poorly drained. These soils have a medium textured surface layer and a medium textured and moderately

coarse textured subsoil. A seasonal high water table is in the upper part of the subsoil in spring. These soils are on very low benches and foot slopes and in flats. They surround lower areas of Halsey soils.

Halsey soils are deep and are very poorly drained. These soils have a medium textured surface layer, a medium textured and moderately coarse textured subsoil, and a coarse textured substratum. A water table is at or near the surface for long periods during the year. These soils are in depressions and very low flats. They receive seepage and runoff from higher adjacent soils.

Soils of minor extent are in the Phelps, Palmyra, Wayland, and Carlisle series. Moderately well drained Phelps soils are on benches and are slightly higher on the landscape than the adjacent dominant soils. Well drained and somewhat excessively drained Palmyra soils are on a few small knolls and ridges. Poorly drained and very poorly drained Wayland soils are on narrow flood plains along a few streams that cross this map unit in places. Carlisle soils are in a few small deep depressions that contain decomposed organic deposits.

This map unit is mainly in water-tolerant trees and permanent pasture. It is not suited to cultivated crops unless it is artificially drained. If drained, it is suited to cultivated crops that can be planted late in the growing season. Wetness is the main soil limitation to most uses of this map unit. Some areas have potential for development of wildlife marshes or as open space corridors.

33. Howard-Chenango, undulating

Deep, well drained and somewhat excessively drained, medium textured and moderately coarse textured soils; in valleys

This map unit consists of nearly level to rolling and sloping soils on glacial outwash plains, stream terraces, and alluvial fans. It is on the floors of some major valleys and on the lower part of valley sides. Slopes range from 0 to 15 percent but are dominantly 3 to 8 percent.

This map unit makes up 2.7 percent of the county. About 60 percent of the unit is Howard soils, and 15 percent is Chenango soils. The rest is soils of minor extent.

Howard and Chenango soils formed in similar glaciofluvial (stream-laid) deposits that have a high content of gravel and sand. The coarse fragments are derived mainly from siltstone, sandstone, and shale and from a small amount of limestone.

Howard soils are deep and are well drained and somewhat excessively drained. These soils have a medium textured and moderately coarse textured surface layer and subsoil and a coarse textured substratum. Permeability is very rapid in the substratum. The coarse fragments in these soils are dominantly gravel. These nearly level to rolling and sloping soils are on benches along the lower part of valley sides and on terraces and in broad flats along valley bottoms.

Chenango soils are deep and are well drained and somewhat excessively drained. These soils have a medium textured surface layer, a medium textured and moderately coarse textured subsoil, and a coarse textured substratum. They have many channery fragments. Permeability is rapid in the substratum. These gently sloping soils are on old alluvial fans in places where side streams enter major valleys. They commonly are adjacent to Howard soils on terraces and benches.

Soils of minor extent are in the Middlebury, Hamlin, Stockbridge, and Fredon series. Moderately well drained and somewhat poorly drained Middlebury soils and well drained Hamlin soils are along flood plains of streams that cross this map unit in places. Well drained Stockbridge soils are on the lower part of valley sides and are closely intermingled with Howard soils in outwash deposits. Somewhat poorly drained and poorly drained Fredon soils are on a few low benches and on foot slopes.

This map unit is used extensively for cultivated crops and hay crops. Some areas are used for pasture, and a few areas are used for woodland. This map unit is well suited to early season crops and deep-rooted crops. In some years droughtiness is a problem in summer. The presence of coarse fragments and the hazard of ground water pollution from disposal of waste are limitations to some uses of this map unit.

34. Palmyra-Howard, hilly

Deep, well drained and somewhat excessively drained, medium textured and moderately coarse textured soils; in valleys

This map unit consists of hilly and steep soils on glacial outwash kames, eskers, and terraces. The landscape is dominantly hills and ridges that have complex slopes and terrace fronts that have simple slopes along valley floors and on the lower part of valley sides. Slopes range from 15 to 45 percent but are dominantly less than 25 percent.

This map unit makes up about 1.7 percent of the county. Palmyra soils make up about 45 percent of the unit, and Howard soils make up about 25 percent. Soils of minor extent make up the rest.

Palmyra and Howard soils formed in glaciofluvial (stream-laid) deposits that contain sandstone, limestone, and siltstone gravel.

Palmyra soils are deep and are well drained and somewhat excessively drained. They have a medium textured and moderately coarse textured surface layer and subsoil and a coarse textured, stratified substratum. Permeability in the substratum is very rapid. These soils are mostly on hills that have short, convex slopes and on escarpmentlike faces of benches and terraces.

Howard soils are deep and are well drained and somewhat excessively drained. They have a medium textured and moderately coarse textured subsoil that has a high content of coarse fragments and a coarse textured, stratified substratum. Permeability in the substratum is very rapid. The content of limestone pebbles is lower than that in Palmyra soils. Howard soils are on short, convex hills and narrow terrace faces along valley bottoms.

Soils of minor extent are mainly in the Arkport, Stockbridge, and Teel series. Well drained, nongravelly Arkport soils are closely intermingled with Palmyra soils in many areas. Well drained Stockbridge soils are along the lower part of valley sides where glacial till is mixed with outwash deposits. Teel soils are on narrow flood plains along streams that cross this map unit in places. Rolling Palmyra and Howard soils are also in this map unit.

This map unit is used mainly for pasture and woodland. Some areas are suited to hay. If cultivated crops are grown, they should be grown infrequently because of the erosion hazard and the difficulty in operating farm equipment. Slope is the principal limitation to most uses of this map unit. Some areas have good suitability as a source of sand and gravel.

35. Palmyra-Phelps, undulating

Deep, moderately well drained to somewhat excessively drained, medium textured soils; in valleys

This map unit consists of nearly level to rolling soils on glacial outwash plains, terraces, and old alluvial fans. The landscape is mainly valley floors and the lower part of valley sides. Slopes range from 0 to 15 percent but are mainly less than 8 percent.

This map unit makes up about 4.5 percent of the county. Palmyra soils make up about 55 percent of the unit, and Phelps soils make up about 20 percent. Soils of minor extent make up the rest.

Palmyra and Phelps soils formed in similar glaciofluvial (stream-laid) deposits that contain sand and gravel derived from limestone, sandstone, and shale.

Palmyra soils are deep and are well drained and somewhat excessively drained. They dominantly have a medium textured surface layer, a medium textured and moderately coarse textured subsoil, and a coarse textured, stratified substratum. Permeability in the substratum is very rapid. These nearly level to rolling soils are on terraces and in broad flats on valley floors, on benches on the lower part of valley sides, and on alluvial fans in places where side streams enter major valleys (fig. 6).

Phelps soils are deep and are moderately well drained. They have a medium textured surface layer, a dominantly medium textured subsoil, and a coarse textured substratum. A temporary seasonal high water table is in the lower part of the subsoil early in spring. These nearly level and gently sloping soils are on moderately low terraces, in flats, and on foot slopes. They are slightly lower on the landscape than the adjacent Palmyra soils.

Soils of minor extent are Ontario Variant soils and Honeoye, Herkimer, Arkport, Teel, and Wayland soils. The well drained Ontario Variant soils and Honeoye soils are closely associated with the major soils in a few large areas that contain glacial till deposits derived from limestone and shale. Herkimer soils are on a few shaly alluvial fans in places where side streams enter main valleys. Well drained Arkport soils are in a few areas of sandy deposits that are free of coarse fragments. Moderately well drained and somewhat poorly drained Teel soils and poorly drained and very poorly drained Wayland soils are on flood plains along a few streams that cross this map unit in places.

This map unit is used mainly for cultivated crops. Some areas are used for hay, and a few areas are used for pasture. Most areas of this map unit are well suited to early planted crops and to deep-rooted crops, for example, alfalfa. There are few limitations to most uses of this map unit, except the presence of coarse fragments and temporary seasonal wetness are limitations in a few areas. In some places there is a hazard of pollution of the underlying ground water from disposal of waste.

36. Wampsville-Palmyra, undulating

Deep, well drained and somewhat excessively drained, medium textured soils; in islandlike areas on the lake plain and at the edge of the uplands

This map unit consists of nearly level to rolling soils on glacial outwash plains and terraces. It is on islandlike benches on the lake plain, kame terraces along the edge of the upland plateau, and a few valley terraces. Slopes range from 0 to 15 percent but are mostly 3 to 8 percent.

This map unit makes up about 0.9 percent of the county. About 45 percent of the unit is Wampsville soils, and 30 percent is Palmyra soils. The rest is soils of minor extent.

Wampsville and Palmyra soils formed in glaciofluvial (stream-laid) deposits that have a high content of fragments of shale, limestone, and sandstone.

Wampsville soils are deep and are well drained. They have a medium textured surface layer and a medium textured and moderately fine textured subsoil. The substratum at a depth of more than 40 inches consists of stratified sand and gravel (fig. 7). Permeability in the substratum is rapid. Coarse fragments are dominantly soft, red shale and sandstone. These soils are on undulating benches, terraces, and moderately broad plains and on low, rolling hills.

Palmyra soils are deep and are well drained and somewhat excessively drained. They have a medium textured surface layer, a medium textured and moderately coarse textured subsoil, and a coarse textured, stratified substratum. Permeability in the substratum is very rapid. Coarse fragments are dominantly limestone and shale. These soils are on benches and terraces and on low, convex, rolling hills. They commonly are near Wampsville soils.

Soils of minor extent are Cazenovia, Phelps, and Arkport soils and Ontario Variant soils. Well drained and moderately well drained Cazenovia soils and well drained, medium textured Ontario Variant soils are in areas that are dominated by reddish glacial till. Moderately well drained Phelps soils are on foot slopes and moderately low terraces. Well drained Arkport soils are in sandier areas and are free of coarse fragments.

This map unit is used mainly for cultivated crops. Corn and alfalfa grow well. A few areas are used for pasture and woodland. Some areas are used as sites for residential development. Except for the presence of coarse fragments, limitations are slight for most uses that require good drainage.

Deep soils that formed in recent alluvium

The 2 map units in this group are on flood plains. They are mainly on valley bottoms, and they are also on the lake plain. They make up about 3.4 percent of the land area in the county. The soils in this group formed mainly in recent deposits of silty alluvium. They are adjacent to streams that are subject to overflow. They are deep, well drained to very poorly drained, and dominantly medium textured. Coarse fragments generally are few or absent. These soils are nearly level.

37. Teel-Hamlin, nearly level

Deep, well drained to somewhat poorly drained, medium textured soils; on flood plains

This map unit consists of nearly level soils on flood plains along valley bottoms and on the lake plain. The landscape is made up of nearly level areas adjacent to streams that occasionally overflow. Slopes range from 0 to 3 percent.

This map unit makes up about 1.4 percent of the county. Teel soils make up about 55 percent of the unit, and Hamlin soils make up about 20 percent. Soils of minor extent make up the rest.

Teel and Hamlin soils formed in similar deposits of silty alluvium.

Teel soils are deep, moderately well drained and somewhat poorly drained, and medium textured. Gravelly layers are common at a depth of more than 40 inches. A temporary seasonal high water table is in the subsoil early in spring. Flooding occurs almost annually in some areas and occurs less frequently in other areas. These soils are in nearly level areas near streams. They are slightly lower on the landscape than the adjacent Hamlin soils.

Hamlin soils are deep, well drained, and medium textured. Gravelly layers are common at a depth of more than 40 inches. Flooding occurs infrequently and generally is of brief duration. These soils are in nearly level, commonly slightly convex areas along streams.

Soils of minor extent are in the Wayland, Weaver, Middlebury, and Phelps series. Poorly drained and very poorly drained Wayland soils are in low, slack water areas. Moderately well drained Weaver soils are in a few areas and have a higher lime content than Teel soils. Middlebury soils are more acid and less silty than Teel soils. Moderately well drained Phelps soils are on a few slightly elevated terraces that are adjacent to the flood plain.

This map unit is used mainly for crops and hay. A few areas are used for pasture and woodland. The soils in this map unit have high natural fertility and are easy to till. In many areas they are suited to row crops, for example, corn, and to some vegetable crops. Flooding is the principal limitation to most uses of this map unit. Areas near urban centers have a potential as open space corridors.

38. Wayland, nearly level

Deep, poorly drained and very poorly drained, medium textured soils; on flood plains

This map unit consists of nearly level soils on flood plains that traverse the lake plain and valley bottoms. The landscape is made up of low, nearly level areas adjacent to streams that are subject to overflow. Slopes range from 0 to 3 percent.

This map unit makes up about 2.0 percent of the county. About 65 percent of the unit is Wayland soils, and the rest is soils of minor extent.

Wayland soils formed in recent deposits of silty alluvium. These soils are deep and are poorly drained and very poorly drained. They have a medium textured surface layer and a medium textured and moderately fine textured subsoil. Flooding occurs about once each year in many areas. A seasonal high water table is at or near the surface for long periods. Depth to the water table depends somewhat on the water level in adjacent streams. These soils are in low flats and slack water areas along streams.

Soils of minor extent are mainly in the Teel, Wallkill, Warners, Fredon, and Palms series. Moderately well drained and somewhat poorly drained Teel soils are adjacent to Wayland soils on the flood plain and are slightly higher on the landscape than those soils. Very poorly drained Wallkill soils, which overlie organic deposits, and very poorly drained Warners soils, which overlie marl, are in a few low areas on the lake plain that are subject to flooding. Somewhat poorly drained and poorly drained Fredon soils are on a few benches adjacent to flood plains. Very poorly drained Palms soils are in very low areas where organic deposits have accumulated. Also in this map unit are large areas of Alluvial land that are adjacent to streams and are subject to frequent flooding.

Most of this map unit is in native wetland vegetation or permanent pasture or is idle. Only a few areas are in cropland because of the difficulty in providing adequate drainage. Flooding and prolonged wetness are the principal limitations to most uses of this map unit. Some areas have potential for development of wetland wildlife habitat or as open space corridors.

Deep soils that formed in organic deposits

The 2 map units in this group are in low flats and depressions that are in the uplands, on the lake plain, and on valley floors. These map units make up about 2.8 percent of the county. The soils in this group formed in organic deposits derived mainly from plant remains. These soils are deep, very poorly drained, and well decomposed.

Some large areas are artificially drained. These soils are nearly level.

39. Carlisle-Palms, nearly level

Deep, very poorly drained, well decomposed organic soils; in uplands, on the lake plain, and in valleys

This map unit consists of nearly level soils in very low areas that have accumulations of organic material. The landscape is mainly broad, swampy basins on the upland plateau, very low flats on the lake plain, and small deep depressions on valley floors. Slopes are mainly less than 1 percent.

This map unit makes up about 1.7 percent of the county. Carlisle soils make up about 40 percent of the unit, and Palms soils make up about 40 percent. Soils of minor extent make up the rest.

Carlisle and Palms soils formed in similar organic deposits of muck that derived from woody and herbaceous plant remains.

Carlisle soils are deep and very poorly drained and are dominantly well decomposed. The muck is 51 inches thick or more and overlies mineral soil deposits. The water table is at or near the surface during much of the year. In many areas these soils are ponded in spring. They are in very low, level depressions and basins.

Palms soils are deep and very poorly drained. The organic material is generally well decomposed. It is 16 to 51 inches thick and overlies loamy mineral soil material. The water table is at the surface during much of the year. These soils are in very low depressions and basins. They commonly are on the outer edge of areas of Carlisle soils, which have thicker organic deposits than Palms soils.

Soils of minor extent are in the Lyons, Wallkill, Canandaigua, and Edwards series. Very poorly drained and poorly drained Lyons soils are in areas of glacial till deposits that do not have thick deposits of organic material. Very poorly drained Wallkill soils are along streams that cross this map unit in places. Poorly drained and very poorly drained Canandaigua soils are on the fringe of areas of this map unit that have silty lake-laid deposits. Edwards soils in a few places where the muck is underlain by marl are also in this map unit.

Most areas of this map unit are undrained and remain in native water-tolerant vegetation. Some areas on the lake plain are drained and are used for vegetables and root crops. If the soils have adequate drainage, this map unit is well suited to special, high value crops; however, windbreaks are needed to control soil blowing (fig. 8). Prolonged wetness and instability of the organic material are the principal limitations to most uses of this map unit. Some areas have potential for improvement of wetland wildlife habitat.

40. Edwards-Martisco, nearly level

Deep, very poorly drained, well decomposed organic soils; on the lake plain

This map unit consists of nearly level soils in very low areas that have organic deposits of muck. The landscape is broad flats and depressions that are mostly on the lake plain. Slopes are mostly less than 1 percent.

This map unit makes up about 1.1 percent of the county. About 35 percent of the unit is Edwards soils, and 35 percent is Martisco soils. The rest is soils of minor extent.

Edwards and Martisco soils formed in similar deposits of organic material that overlie marl.

Edwards soils are deep and are very poorly drained. The muck deposits are well decomposed and derived primarily from plant remains. The deposits are 16 to 51 inches thick and overlie marl. In undrained areas the water table is at or near the surface during much of the year. These soils are in very low, nearly level basins and depressions.

Martisco soils are deep and are very poorly drained. The muck deposits are well decomposed and overlie marl at a depth of 8 to 16 inches. In undrained areas the water table is near the surface during much of the year. These soils are in low flats and depressions. They commonly are on the outer fringe of Edwards soils, which have thicker organic deposits than Martisco soils.

Soils of minor extent are in the Willette, Palms, Fonda, and Warners series. Very poorly drained Willette soils are in some large areas where muck overlies lacustrine clay and silt. Palms soils are in a few areas that are underlain by loamy mineral soil material. Mucky Fonda soils are deep, fine textured mineral soils that are on the edge of some areas of this map unit. Warners soils are in places where silty mineral soil overlies marl. Also in this map unit is a mucky soil that is less than 8 inches deep to marl.

Many areas of this map unit are drained and are used for special crops, for example, onions, and for other vegetable crops. Some areas, especially areas of Martisco soils, are idle and are reverting to native wetland vegetation. Prolonged wetness and instability are the principal limitations to most uses of this map unit. Areas that have thick marl deposits have potential as a source of lime. Some areas of this map unit have potential for improvement of wetland wildlife habitat.

Description of the soils

In this section, each soil series and map unit recognized in the survey area is described. Each soil series is described in detail, and then, briefly, each map unit in that series is described. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. Then a profile, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*12*). Unless otherwise noted, colors described are for moist soil.

Following the profile description, the range of important characteristics of the soil series in this survey area is given and the soil is compared to similar soils and to nearby soils of other series. Then, the map units in the soil series are described.

These map units are shown on the detailed soil maps at the back of this publication. They represent the kinds of soil in the survey area. The descriptions of the map units together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have profiles that are almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. The Wampsville series, for example, was named for the town of Wampsville in Madison County.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Wampsville gravelly silt loam, nearly level, is one of several phases within the Wampsville series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes, soil associations, and undifferentiated groups.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Palmyra-Arkport complex, hilly, is an example.

A *soil association* is made up of soils that are geographically associated and are shown as one unit on the map because it is not practical to separate them. A soil association has considerable regularity in geographic pattern and in the kinds of soil that are a part of it. The extent of the soils can differ appreciably from one delineation to another; nevertheless, interpretations can be made for use and management of the soils. No soil associations are in Madison County.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them. Palmyra and Howard soils, steep, is an undifferentiated group in this survey area.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Alluvial land is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 1, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*12*).

Alden series

The Alden series consists of deep, very poorly drained soils. These soils formed in a thin mantle of silty colluvium and in the underlying glacial till. They are nearly level and are in low areas and slight depressions on the upland plateau and the lake plain.

In a representative profile very dark gray muck 4 inches thick overlies the surface layer. The surface layer is black mucky heavy silt loam 7 inches thick. The upper part of the subsoil is friable, mottled, gray silt loam 12 inches thick, and the lower part is friable, mottled, dark gray gravelly loam 15 inches thick. The substratum extends to a depth of 60 inches and is firm, gray to grayish brown gravelly heavy loam.

These soils have a water table that is at or near the surface for long periods during the year. It commonly is perched above the moderately slowly permeable subsoil and substratum. In some areas these soils are ponded for brief periods early in spring. Unless the soils are drained,

roots are mostly confined to the upper 12 inches of soil. In drained areas, roots can extend to the substratum and available water capacity is high. The natural supply of nitrogen is high, but nitrogen is released slowly to plants when the soils are wet and cold. The natural supply of phosphorus is low, and the supply of potassium is medium (7). The natural content of lime is medium.

Most areas of these soils are in trees or are idle and are reverting to brush. A few undrained areas are in pasture, but quality of the forage is poor. Prolonged wetness is the main limitation to most nonfarm uses of these soils.

Representative profile of Alden mucky silt loam, in a wooded area 200 yards south of Excell Road and 1/2 mile east of Williams Road in the town of Hamilton:

O2—4 inches to 0; very dark gray (10YR 3/1) sapric material muck; 25 percent fibers unrubbed, less than 5 percent rubbed; 50 percent mineral material; moderate fine granular structure; friable; many fine live roots; few woody fragments; medium acid; abrupt smooth boundary.

A1—0 to 7 inches; black (10YR 2/1) mucky heavy silt loam; weak coarse granular structure; friable, slightly sticky; common fine roots; slightly acid; abrupt smooth boundary.

B21g—7 to 19 inches; gray (N 5/0) silt loam; few fine distinct dark yellowish brown (10YR 4/4) and common fine faint grayish brown (2.5Y 5/2) mottles; weak medium and coarse subangular blocky structure; friable and nonsticky; few fine roots in upper part; few fine pores; 5 percent coarse fragments; slightly acid; clear smooth boundary.

IIB22g—19 to 34 inches; dark gray (N 4/0) gravelly loam; few medium prominent yellowish red (5YR 4/6) and common medium distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; friable; common fine pores; 15 percent coarse fragments; slightly acid; gradual wavy boundary.

IICg—34 to 60 inches; gray to grayish brown (10YR 5/1 and 5/2) gravelly heavy loam; common medium distinct yellowish brown (10YR 5/4) mottles; massive; firm; 20 percent coarse fragments, percentage increases with increasing depth; neutral.

The solum ranges from 26 to 36 inches thick. Carbonates are at a depth of more than 40 inches. Depth to bedrock is more than 60 inches. Coarse fragments are mostly gravel or channery fragments. They make up 0 to 10 percent, by volume, of the upper part of the solum and 5 to 35 percent of the lower part of the solum and the substratum. Reaction is slightly acid or neutral in the solum and neutral to moderately alkaline in the substratum.

Some areas do not have an O horizon. In plowed areas the O horizon is mixed with the A1 horizon.

Some areas have an Ap horizon. Organic-matter content in the A1 or Ap horizon generally is high. Hue is 10YR, or the color is neutral. Value is 2 or 3, and chroma is 0 or 1. Structure is granular or subangular blocky.

The Bg horizon ranges from very fine sandy loam to light silty clay loam, and gravelly analogues are common in the lower part. Hue is 7.5YR to 2.5Y, or the color is neutral. Value is 4 or 5, and chroma is 0 to 2. High chroma mottles are few to common and generally are larger and more numerous with increasing depth. Structure is subangular blocky or prismatic. Consistence is friable or firm. Material that is slightly coarser in texture is in the Bg horizon in some profiles.

The Cg horizon ranges from gravelly fine sandy loam to silty clay loam. Color is similar to that of the Bg horizon, except chroma generally is slightly higher. Structure is platy, or the material is massive.

In upland areas Alden soils are near Chippewa soils. They are similar to Chippewa soils, but unlike those soils they do not have a dense fragipan and they have a silty mantle. They have drainage similar to Lyons soils but do not have free lime above a depth of 40 inches, which those soils have. On the lake plain Alden soils commonly are near the poorly drained and very poorly drained Canandaigua soils, and they have a thinner silty mantle than those soils.

Ad—Alden mucky silt loam. This soil formed in glacial till that has a silty mantle of local colluvium 16 to 36 inches thick. It commonly is in low areas and depressions. Slope is 0 to 2 percent. This soil receives a moderate to large amount of runoff from higher adjacent soils. Runoff is very slow.

Included with this soil in mapping are small areas of shallow muck in depressions that are deeper than those of the Alden soil. Also included are a few small areas of soils that have a weakly developed fragipan in the lower part of the subsoil and a few small areas of poorly drained and very poorly drained Canandaigua soils.

This soil is not suited to most crops unless it is drained. Artificial drainage is difficult to establish in some places because of a lack of suitable outlets. Where outlets are available, use of open drains and tile drains is feasible. In some places sloughing and flowing of the silty material hinders maintenance and installation of drainage systems. If drained, this soil is easy to work and good soil tilth is not difficult to maintain. Minimum tillage, returning crop residue to the soil, and use of cover crops are desirable conservation practices.

The prolonged high water table near the surface and moderately slow permeability are the main limitations to the use of this soil for nonfarm purposes. In many areas this soil has potential for development of wildlife marshes, as sites for ponds, or as open space. Capability subclass IVw.

Alluvial land

AL—Alluvial land. This map unit is a miscellaneous area that consists mostly of deposits of recent alluvium on flood plains. Most areas are along narrow secondary streams. A few areas near Oneida Lake are subject to flooding when the water level in the lake is high. Annual flooding is common in areas of Alluvial land, and the soil material commonly is moved from place to place when the level of the floodwater is high. Soil profile development is absent or is weak. Where the development is weak, the soil pattern is so variable that separate mapping of distinct kinds of soil is impractical.

In some areas the deposits are very gravelly or stony, and in other areas they are nearly free of coarse fragments. Drainage commonly varies greatly within a short distance, but Alluvial land is dominantly somewhat poorly drained to very poorly drained. Slopes are mostly less than 5 percent. The surface topography is variable because of stream scour and the presence of remnant channels.

Alluvial land has limited potential for farming. Many areas that previously were cleared and used for pasture have reverted to brush and weeds. Some areas are wooded.

The susceptibility of these areas to flooding and the variable characteristics of the deposits are limitations to

the use of this map unit for nonfarm purposes. Capability subclass Vw.

Angola series

The Angola series consists of moderately deep, somewhat poorly drained soils. These soils formed in a thin mantle of glacial till that has a high content of silty shale fragments derived from the underlying bedrock. They are nearly level and are on the upland plateau and in islandlike areas on the lake plain.

In a representative profile the surface layer is very dark grayish brown silt loam 10 inches thick. The upper part of the subsoil is friable, mottled, dark grayish brown silt loam 10 inches thick, and the lower part is friable, mottled, dark grayish brown shaly silt loam 2 inches thick. Hard, dark gray silty shale is at a depth of 22 inches.

A seasonal high water table is perched above the shale bedrock in spring and in other excessively wet periods. Bedrock is at a depth of 20 to 40 inches. Permeability is moderate in the surface layer and slow in the subsoil. Roots are somewhat restricted by the perched water table and the underlying bedrock. Available water capacity is moderate to low. The natural supply of nitrogen is moderate to high, but nitrogen is released slowly to plants in spring when the soil is damp and cold. The supply of phosphorus is low, and the supply of potassium is medium. The natural content of lime is medium to high.

These soils are used mostly for hay and pasture crops and for woodland. In some areas they are used for row crops. Depth to bedrock and seasonal wetness are limitations to most nonfarm uses of these soils.

Representative profile of Angola silt loam, in a meadow 300 yards north of Clark Road and 45 feet west of abandoned Stone Quarry Road in the town of Sullivan:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) rubbed; moderate fine granular structure; friable; many fine roots; 5 percent coarse fragments; slightly acid; clear smooth boundary.

B21t—10 to 20 inches; dark grayish brown (10YR 4/2) silt loam; many fine and medium faint brown (10YR 5/3) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; common fine roots; common fine and few medium pores; thick clay linings in pores and discontinuous clay films on ped faces; 10 percent coarse fragments; neutral; clear wavy boundary.

B22t—20 to 22 inches; dark grayish brown (10YR 4/2) shaly silt loam; common fine faint brown (10YR 5/3) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; friable; slightly sticky; few fine roots; common fine pores; continuous thick clay linings in pores and thick clay films on faces of peds; 20 percent coarse fragments; neutral; abrupt smooth boundary.

R—22 inches; dark gray (10YR 4/1) silty shale bedrock; few vertical joints filled with material from the B23t horizon; neutral to mildly alkaline.

The solum ranges from 20 to 30 inches thick. Carbonates are present above the bedrock in some places. Depth to shale or limestone bedrock is 20 to 40 inches. Coarse fragments are mostly dark gray shale. They make up 0 to 25 percent, by volume, of the upper part of the solum, and the percentage increases to as much as 35 percent in the lower part of the C horizon. Reaction is slightly acid to neutral in the solum. Where a C horizon is present, it is neutral to mildly alkaline.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2.

The B horizon ranges from silt loam to light silty clay loam, and shaly analogues of these textures are common. The B horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. In the upper part of the B horizon, ped interiors dominantly have chroma that is higher than 2 and that commonly is 3. Mottles that have high chroma range from common to many. Structure is blocky or prismatic, or both. Consistence is friable or firm.

In some places there is a C horizon. The C horizon, where present, ranges from shaly silt loam to shaly light silty clay loam. This horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma mostly of 2. Consistence is firm.

The bedrock is mainly dark gray or very dark gray.

Angola soils form a drainage sequence with the moderately well drained Aurora soils and formed in material similar to that in which those soils formed. They are near Appleton and Ovid soils. Angola soils have texture and drainage similar to those soils but have bedrock at a depth of less than 40 inches.

An—Angola silt loam. This soil is nearly level and somewhat poorly drained. It formed in glacial till deposits and is 20 to 40 inches deep to bedrock. Slopes range from 0 to 3 percent. This soil receives a moderate to large amount of runoff from adjacent higher soils. Some landscapes have a stairstep topography.

Included with this soil in mapping are small areas of a soil in shallow depressions and drainageways that is similar to this Angola soil but is poorly drained. Also included are a few small areas of deep Ovid and Appleton soils and a soil that is similar to this Angola soil but is less than 20 inches deep to bedrock.

This soil is suited to cultivated crops. Unless the soil is drained, however, planting is delayed in spring and harvesting is difficult in fall if the soil is wet. Tile drains are difficult to install in some places because of the shallow depth to bedrock. Open drains, for example, sod waterways, help to intercept and divert runoff from adjacent higher soils. If undrained, this soil is suited to short season crops and to water-tolerant hay and pasture plants. Minimum tillage and the use of cover crops help to maintain good soil tilth and increase available water capacity.

The depth to bedrock is the main limitation to the use of this soil for nonfarm purposes, although the bedrock is rippable in some areas. Seasonal wetness and slow permeability also are limitations. Capability subclass IIIw.

Appleton series

The Appleton series consists of deep, somewhat poorly drained soils. These soils formed in glacial till deposits derived from limestone, shale, and sandstone. They are nearly level and gently sloping and are on the lake plain and the low upland plateau.

In a representative profile the surface layer is very dark grayish brown loam 8 inches thick. The leached subsurface layer is mottled, light brownish gray loam 4 inches thick. The subsoil is friable, mottled, brown loam 12 inches thick. The substratum is firm, brown gravelly fine sandy loam and extends to a depth of 62 inches.

A seasonal high water table is perched above the slowly permeable subsoil and substratum in spring and in other excessively wet periods. Roots are mostly confined to the upper part of the subsoil, but a few roots may penetrate more deeply as the water table recedes late in spring. Available water capacity is moderate to high. The natural content of nitrogen is medium to high, but nitrogen is released slowly to plants when the soils are damp and cold in the spring. The natural supply of phosphorus is low, and the content of available potassium is medium to high. The natural content of lime is medium to high. These soils are used mostly for hay and pasture crops and for woodland. Cultivated areas commonly are artificially drained. Seasonal wetness and slow permeability are the main limitations to most nonfarm uses of these soils.

Representative profile of Appleton loam, 0 to 3 percent slopes, in a meadow 25 feet east of North Main Street and 0.3 mile south of State Route 31 in the town of Lenox:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; friable; few medium and many fine roots; 5 percent coarse fragments; slightly acid; clear smooth boundary.

A2—8 to 12 inches; light brownish gray (10YR 6/2) loam; common fine faint brown (10YR 5/3) and few fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; many fine roots; many fine pores; many vertical dark grayish brown (10YR 4/2) macropores; 8 percent coarse fragments; neutral; gradual irregular boundary.

B2t—12 to 24 inches; brown (10YR 5/3) loam; many fine distinct strong brown (7.5YR 5/6) and light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable and slightly sticky; few fine roots; common fine pores; grayish brown (10YR 5/2) material on faces of peds; fingers of light brownish gray (10YR 6/2) material from the A2 horizon that is less than 2 millimeters thick on faces of peds in the upper 3 inches; thick discontinuous clay films on faces of peds and around some coarse fragments; continuous clay linings in pores; 10 percent coarse fragments; neutral; gradual wavy boundary.

C—24 to 62 inches; brown (10YR 5/3) gravelly fine sandy loam; many medium distinct brownish yellow (10YR 6/6) and common fine faint light brownish gray (10YR 6/2) and olive (5Y 5/3) mottles; weak thin and medium platy structure; firm in places; many fine pores; few thin discontinuous lenses of sand and silt; 15 percent coarse fragments, percentage increases with increasing depth; strongly calcareous; moderately alkaline.

The thickness of the solum and the depth to carbonates range from 20 to 32 inches. Depth to bedrock is more than 5 feet. Coarse fragments are mainly gravel and stones of mixed lithology. They make up 5 to 25 percent, by volume, of the solum and commonly are more numerous with increasing depth. Reaction is medium acid to neutral in the upper part of the solum and medium acid to mildly alkaline in the lower part of the solum.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2.

The A2 horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2. Mottles are few or common.

The Bt horizon is loam or heavy silt loam, and gravelly analogues of these textures are common in some profiles. Some subhorizons are light sandy clay loam. The Bt horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma mainly of 3. Ped faces have value of 5 or 6 and chroma of 2. Mottles of high and low chroma are common to many. Structure is subangular blocky or prismatic. Consistence is friable or firm.

The C horizon is slightly coarser textured and is firmer than the Bt horizon. Color is similar to that of the Bt horizon.

Appleton soils form a drainage sequence with the well drained Honeoye soils and Ontario Variant soils and with the moderately well drained Lima and Hilton soils. In some areas Appleton soils are near Angola soils. They are similar to those soils but are deeper to bedrock.

AoA—Appleton loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. In upland areas this soil commonly receives some runoff from higher, better drained soils. Small narrow areas of this soil are common along field drainageways. On the lake plain this soil receives a little runoff from adjacent soils, but runoff is removed slowly.

Included with this soil in mapping are a few small areas of moderately well drained Hilton and Lima soils on slight rises and poorly drained Lyons soils in deep depressions. Also included is a soil that has a surface layer and subsoil of fine sandy loam in a few areas north of the village of Canastota. In the west-central part of the county, a soil that is similar to this Appleton soil but is darker colored in the subsoil is also included.

This soil is suitable for hay and pasture crops and woodland. It is suitable for cultivated crops, but artificial drainage is needed for optimum growth. Unless the soil is drained, planting is delayed in spring and crop response to good management is poor. Subsurface drains generally function well if suitable outlets are available. Minimum tillage and the use of cover crops help to preserve good soil tilth in intensively cultivated areas. In some areas coarse fragments slightly hinder the operation of some precision tillage equipment.

Seasonal wetness and slow permeability are limitations to the use of this soil for nonfarm purposes. Artificial drainage generally is needed if this soil is used for homesites. Capability subclass IIIw.

AoB—Appleton loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, except mottles are fewer in number and are less distinct directly below the surface layer. This soil receives runoff from higher adjacent soils, but runoff does not accumulate as readily as on the nearly level Appleton soil.

Included with this soil in mapping are a few small areas of poorly drained Lyons soils in depressions and along drainageways. A few areas in which stones and boulders cover more than 5 percent of the surface are also included. These areas are indicated on the soil map by the symbol for a stony spot. Also included are a few areas of soils that have slopes of 8 to 15 percent. In the west-central part of the county, a soil that is similar to this Appleton soil but is darker colored in the subsoil is also included.

This soil is suited to hay and pasture crops and trees. In undrained areas the choice of cultivated crops is limited to those that can be planted late in spring or to perennial crops that can tolerate wetness early in the growing season. If adequately drained, this soil is suited to many cultivated crops. Interceptor drains can be used to divert and remove runoff. Erosion is a hazard in cultivated areas unless the soil is adequately protected.

Cross slope tillage, use of cover crops, and minimum tillage reduce erosion and preserve good soil tilth.

The use of this soil for many nonfarm purposes is limited by seasonal wetness, slow permeability, and slope. Some areas have potential as pond sites. Capability subclass IIIw.

Arkport series

The Arkport series consists of deep, well drained soils that formed in glaciofluvial deltaic deposits that are mainly fine sand and very fine sand. These gently sloping to steep soils are on the lake plain and in some of the larger valleys.

In a representative profile the surface layer is dark brown fine sandy loam 10 inches thick. The upper part of the subsoil is strong brown fine sandy loam 10 inches thick. The lower part of the subsoil is very friable, brown loamy fine sand 37 inches thick that has bands of slightly firmer, reddish brown fine sandy loam and very fine sandy loam 1 to 5 inches thick. The substratum is very friable, reddish brown loamy very fine sand.

The water table generally is below a depth of 6 feet throughout the year. Permeability is moderately rapid throughout the soil. Root penetration is excellent. Available water capacity is moderate to low. These soils can be tilled early in spring. The natural supply of nitrogen is medium. Content of phosphorus is very low, and content of available potassium is low. The natural content of lime is low to medium.

Most areas of these soils are used for cultivated crops and hay and pasture crops. These soils have very few limitations, except slope in some areas, to nonfarm uses that require good drainage.

Representative profile of Arkport fine sandy loam, rolling, in a pasture 50 feet west of County Road 33 and 3/4 mile south of the Oneida County line in the city of Oneida:

Ap—0 to 10 inches; dark brown (7.5YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine roots; 1 percent coarse fragments; slightly acid; abrupt smooth boundary.

B21—10 to 20 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium and fine subangular blocky structure; very friable; many fine roots; many fine pores; slightly acid; clear smooth boundary.

A'2 and B22t—20 to 57 inches; brown (7.5YR 5/4) loamy fine sand; single grain; very friable; common pinkish gray (7.5YR 6/2) skeletons; reddish brown (5YR 4/4) fine sandy loam and very fine sandy loam Bt material as wavy, branching horizontal lamellae that individually are 1 to 5 inches thick and are 11 inches in total thickness; lamellae have weak fine subangular blocky structure and are friable; common fine roots in upper half; common fine pores; clay bridges between sand grains in lamellae; slightly acid; abrupt wavy boundary.

C—57 to 80 inches; reddish brown (5YR 5/3) loamy very fine sand; few fine faint light reddish brown (5YR 6/3) mottles; single grain; very friable; 10 percent coarse fragments in upper part; neutral; abrupt smooth boundary.

The solum is 45 to 90 inches thick, and depth to carbonates is 42 to 108 inches. Depth to bedrock is more than 6 feet. Coarse fragments commonly are absent in the solum but make up as much as 3 percent, by volume, of some subhorizons. Reaction is strongly acid to slightly acid in the solum, and the soil commonly is less acid with increasing depth.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma mainly of 2.

The B horizon ranges from loamy fine sand to very fine sandy loam. It has hue of 10YR to 5YR, value of 5 or 6, and chroma of 4 to 6. Structure is weak, or the material is massive. Consistence is friable or very friable.

The A2 portion of the A'2 and B2t horizon ranges from loamy fine sand to very fine sand. It has hue of 5YR to 10YR, value of 5 or 6, and chroma of 2 to 4. Structure is very weak, or the material is single grain. Consistence is loose or very friable.

The B2t portion of the A'2 and B2t horizon consists of lamellae that have texture of silt loam, very fine sandy loam, or fine sandy loam. The B2t portion has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 3 or 4. The material is massive, or structure is weak subangular blocky. Consistence is friable or firm. Lamellae range from 1/4 inch to 5 inches in thickness and have a total thickness of more than 6 inches.

The C horizon has texture and color similar to those of the A2 horizon, except it has strata of gravel and subhorizons of fine sand in some profiles. A few mottles are present at a depth of more than 40 inches in some profiles.

Arkport soils are in a drainage sequence with moderately well drained Galen soils, somewhat poorly drained Minoa soils, and poorly drained and very poorly drained Lamson soils. They formed in sandy deposits similar to those in which the somewhat excessively drained Colonie soils formed, but unlike Colonie soils they have subsoil bands (lamellae) that have a total thickness of more than 6 inches.

ArB—Arkport fine sandy loam, undulating. This soil has a profile similar to the one described as representative of the series, except it commonly has faint mottles at a slightly shallower depth in the substratum. This soil is on undulating landscapes and on low, smooth, convex ridges. Slopes range from 3 to 8 percent. This soil receives little or no runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of moderately well drained Galen soils and somewhat poorly drained Minoa soils in shallow drainageways and depressions. Also included are a few small areas of nearly level Arkport soils and soils that have sandy loam or silt loam bands in the subsoil that are more than 6 inches thick.

This soil is well suited to cultivated crops, hay and pasture crops, and trees. It is especially well suited to early season vegetable crops. The hazard of erosion is moderate, and controlling soil blowing is a concern in exposed areas. Use of cover crops, return of crop residue to the soil, and minimum tillage reduce erosion and soil blowing. This soil is exceptionally easy to till. It has excellent response to a high level of fertilization and timely irrigation, especially if shallow-rooted crops are grown.

This soil is suited to many nonfarm purposes that do not require level ground. Many areas are suited to residential development, but instability of the soil material is a limitation to the use of this soil for large multistory structures. Capability subclass IIe.

ArC—Arkport fine sandy loam, rolling. This soil has the profile described as representative of the series. Slopes range from 8 to 15 percent. In most areas the slopes are short and complex. In a few areas they are smooth and simple. This soil generally does not receive runoff.

Included with this soil in mapping are some moderately large areas of Colonie soils, which are similar to this Ark-

port soil. Also included are a few small areas of soils that are similar to this Arkport soil but that have subsoil bands of sandy loam and silt loam that are more than 6 inches thick. A few small areas of severely eroded soils that commonly are cut by shallow rills and gullies are also included.

This soil is suited to some cultivated crops, but it is better suited to hay and pasture and to trees. The hazard of erosion is severe if the soil is exposed, and the hazard of soil blowing is moderate in some areas. Practices to conserve soil and water, for example, contour tillage, commonly are difficult to establish because of the complex slopes.

Although this soil is easy to till, the relatively loose sandy material can slightly hinder traction of heavy equipment. Crop response to a high level of fertilization is excellent if moisture is available.

Slope is the main limitation to the use of this soil for nonfarm purposes that require good drainage. Where the gradient of slope is reduced by grading, this soil is suited to homesites. In some areas it has potential as a source of sand. Capability subclass IIIe.

ArD—Arkport fine sandy loam, hilly. This soil has a profile similar to the one described as representative of the series, except the surface layer and subsoil are thinner. Slopes range from 15 to 25 percent and are mostly short. This soil commonly receives runoff from higher adjacent soils.

Included with this soil in mapping are a few large areas of Colonie soils and small areas of severely eroded and very severely eroded soils.

This soil is not well suited to cultivated crops, because of steepness of slope and the poor traction of farm equipment that results from the sandy soil material. The operation of equipment is very difficult and hazardous. The hazard of erosion is severe, and the hazard of soil blowing is moderate in exposed areas. If cultivated crops are grown, they should be grown infrequently and a maximum of soil and water conservation practices should be used. This soil generally is more droughty and lower in content of available nutrients than less sloping Arkport soils.

Nonfarm uses of this soil are limited because of the moderately steep slopes. In some areas this soil has potential as a source of sand. Capability subclass IVe.

Arnot series

The Arnot series consists of shallow, moderately well drained to somewhat excessively drained soils. These soils formed in a thin mantle of glacial till and in frost-fractured material derived from the underlying sandstone, siltstone, and shale bedrock. They are gently sloping to very steep and are at the higher elevations of the dissected upland plateau.

In a representative profile a mat of black, humified organic material 1 inch thick is on the surface. The surface layer is dark brown channery silt loam 1 inch thick. The subsoil is very channery silt loam 16 inches thick. It is strong brown to brown and very friable in the upper part and is yellowish brown and friable in the lower part. Dark gray, fine-grained sandstone is at a depth of 17 inches.

In areas where these soils are moderately well drained, a seasonal high water table commonly is perched above the bedrock for brief periods in spring. In other areas the bedrock is jointed and somewhat shattered and allows free water to infiltrate. Permeability is moderate. Roots are restricted to the 10 to 20-inch zone above the bedrock. Available water capacity is very low to low. The natural supply of nitrogen is medium, and supply of phosphorus is very low. Supply of available potassium is low in unlimed areas. The natural content of lime is low to very low.

Most areas of these soils are in pasture and trees or are idle. Some areas are in cultivated crops and hay. Shallow depth to bedrock is the main limitation to most nonfarm uses of these soils.

Representative profile of Arnot channery silt loam, 3 to 8 percent slopes, in a wooded area 50 feet east of a State Forest road, 0.4 mile south of Davenport Road and 1 3/4 miles east of DeRuyter-Georgetown township line in the town of Georgetown:

O2—1 inch to 0; black (10YR 2/1) humified organic material in a tight mat of fine roots; weak fine granular structure; very friable; very strongly acid; abrupt smooth boundary.

A1—0 to 1 inch; dark brown (7.5YR 3/2) channery silt loam; weak fine granular structure; very friable; many fine and medium roots and few large roots; many fine pores; 25 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B21—1 to 7 inches; brown (7.5YR 4/4) and strong brown (7.5YR 5/6) very channery silt loam; weak medium and fine subangular blocky structure; very friable; many fine and medium roots; many fine pores; thin discontinuous light brownish gray (10YR 6/2) A2 material 1/4-inch thick on top of horizon; 35 percent coarse fragments; very strongly acid; gradual wavy boundary.

B22—7 to 17 inches; yellowish brown (10YR 5/4) very channery silt loam; few fine and medium faint strong brown (7.5YR 5/6) mottles in lower 2 inches; weak medium and fine subangular blocky structure; friable; many to common fine roots; many fine pores; 45 percent coarse fragments; strongly acid; abrupt smooth boundary.

R—17 inches; dark gray (10YR 4/1) and reddish gray fine-grained thin to moderately thick bedded sandstone.

The thickness of the solum and the depth to bedrock range from 10 to 20 inches. Flat angular channery fragments and, in places, flagstones that are similar to the underlying bedrock make up 35 to 50 percent, by volume, of the subsoil. Reaction is very strongly acid to medium acid in the solum.

In some places there is an Ap horizon. The A1 or Ap horizon is mainly channery silt loam but is very channery silt loam and flaggy silt loam in places. The A1 horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma mainly of 2. The Ap horizon, where present, has value of 3 or 4, and chroma of 2 or 3. In some undisturbed areas there is a thin discontinuous A2 horizon.

The B horizon is mainly silt loam or loam and includes their very channery analogues. This horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. High chroma mottles are above the bedrock in some profiles. Structure is weak subangular blocky, or the material is massive. Consistence is friable or very friable. A thin C horizon is in some profiles.

The horizontal bedrock is acid sandstone, siltstone, or shale and is commonly interbedded.

Arnot soils are in a drainage sequence with the somewhat poorly drained Tuller soils and formed in material similar to that in which

those soils formed. Arnot soils are near the moderately deep Lordstown soils. They are similar to Lordstown soils but are shallower to bedrock.

AsB—Arnot channery silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It is mostly on slightly convex hilltops and ridges. It receives little or no runoff from adjacent soils. In some areas the underlying bedrock causes the landscape to have a stairstep appearance.

Included with this soil in mapping are a few areas of moderately deep Lordstown soils and a few small outcrops of bedrock. A few areas of somewhat poorly drained and poorly drained Tuller soils are also included and are identified on the soil maps by the symbol for a wet spot.

This soil is suited to some cultivated crops and to hay. However, crop production is low in some years because of droughtiness in summer and a relatively short growing season. In many areas this soil is better suited to pasture and trees. Although erosion is only a slight hazard, controlling erosion is important to preserve the thin soil mantle. Contour tillage, use of cover crops, and minimum tillage are practices that can be used in most areas of this soil. Drainage of wet spots is difficult because of the shallow depth to bedrock. Coarse fragments hinder the operation of some precision tillage equipment.

The shallow depth to hard bedrock causes extreme difficulty in excavating for underground installations, for example, septic effluent fields. In some areas this soil has potential for some recreational uses. Capability subclass IIIs.

AsC—Arnot channery silt loam, 8 to 15 percent slopes. This soil has a profile similar to the one described as representative of the series, except it is slightly shallower to bedrock. It is on slightly convex hillsides and the upper part of valley sides. It commonly receives some runoff from higher adjacent soils. Many of the slopes are short and have a stairstep, or benched, appearance.

Included with this soil in mapping are a few small areas of moderately deep Lordstown soils. Also included are small seep spots and springs. A few outcrops of bedrock are also included and are indicated on the soil maps by the symbol for Rock outcrops.

Droughtiness, a relatively short growing season, and a moderate to severe hazard of erosion are limitations to the use of this soil for cultivated crops. In most areas this soil is better suited to trees and pasture. Controlling erosion is extremely important to preserve the thin soil mantle. If this soil is cultivated, a maximum of soil and water conservation measures should be used and the cropping system should consist mainly of sod crops. Tillage is difficult in some areas because of coarse fragments, rock outcrops, and stairstep slopes.

Shallow depth to bedrock, slope, and the presence of coarse fragments are limitations to the use of this soil for most nonfarm purposes. Some areas have potential as shale quarries or for some recreational uses. Capability subclass IVe.

ATF—Arnot-Lordstown complex, very steep. This map unit consists of about 60 percent Arnot soil and 25 percent Lordstown soil. These soils form such an intricate pattern on the landscape that it was impractical to map them separately at the scale used. The surface layer is channery silt loam, very channery silt loam, or flaggy silt loam. These soils have a profile similar to the one described as representative of their series, except they have a thinner surface layer and subsoil. Also, they commonly have more and larger coarse fragments in the surface layer, particularly the Arnot soil. Slopes range from 60 to 80 percent. This map unit is along valley sides.

Included with these soils in mapping are some large areas of Rock outcrop. Also included are a few areas of severely eroded soils that are less than 10 inches deep to bedrock. A few seep spots and areas of wetter soils along drainageways near toe slopes are also included.

The soils in this map unit are not suited to cultivated crops or pasture. Steep slopes and the presence of Rock outcrop prevent the use of farm machinery. In most areas these soils are best suited to native woodland. The hazard of erosion is very severe in areas where timber has been clearcut.

Because of very steep slopes, these soils are not suited to most nonfarm purposes. Capability subclass VIIs.

Aurora series

The Aurora series consists of moderately deep, moderately well drained soils. These soils formed in a thin mantle of glacial till and in frost-fractured material derived from the underlying shale bedrock. They are gently sloping to moderately steep and are on the upland plateau and along valley sides.

In a representative profile the surface layer is very dark grayish brown silt loam 6 inches thick. The subsurface layer is friable, brown silt loam 3 inches thick. The subsoil is 19 inches thick. The upper part is dark brown heavy silt loam, and the lower part is friable, mottled, dark reddish brown shaly light silty clay loam. The substratum is firm, reddish brown shaly heavy silt loam 6 inches thick. Gray and black shale is at a depth of 34 inches.

A temporary seasonal high water table commonly is perched above the substratum or bedrock early in spring. Bedrock is at a depth of 20 to 40 inches. Permeability in the subsoil and substratum is slow. Most roots are restricted by the underlying bedrock. Available water capacity is moderate. The natural content of nitrogen is medium, supply of phosphorus is low, and content of available potassium is medium to high. The natural content of lime is medium to high.

These soils are used for cultivated crops, pasture, and trees. In some areas they are idle. Moderate depth to bedrock, slow permeability, and temporary seasonal wetness are the main limitations to nonfarm uses of these soils.

Representative profile of Aurora silt loam, 3 to 8 percent slopes, in a shale pit adjacent to a pasture, 50 feet west of Perryville Road and 1/4 mile south of its junction with Seibenbaum Road in the town of Fenner:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine and medium granular structure; very friable; many fine and medium roots; few coarse roots; 10 percent coarse fragments, 50 percent are hard shale and 50 percent are soft shale; slightly acid; clear smooth boundary.

A2—6 to 9 inches; brown (10YR 5/3) silt loam; weak fine subangular blocky structure; friable; many fine and medium roots; many fine pores; common dark organic wormcasts and root stains; 10 percent coarse fragments, 50 percent are hard shale and 50 percent are soft dark shale; medium acid; clear wavy boundary.

B&A—9 to 14 inches; dark brown (10YR 4/3) heavy silt loam; weak medium subangular blocky structure; friable; many fine and common medium roots; common fine pores; patchy clay linings in pores; brown (10YR 5/3) silt loam coatings;, light gray (10YR 7/2) dry, that are 1 to 2 millimeters thick on faces of peds; 14 percent coarse fragments, dominantly shale; slightly acid; gradual wavy boundary.

B2t—14 to 28 inches; dark reddish brown (5YR 3/3) shaly light silty clay loam; few fine distinct strong brown (7.5YR 5/6) and common fine distinct brown (7.5YR 5/2) mottles; moderate medium subangular blocky structure; friable to firm, and slightly sticky; few fine roots; thick clay linings in pores and clay coatings on some coarse fragments; thin continuous clay films on faces of peds; 20 percent coarse fragments; neutral; gradual wavy boundary.

C—28 to 34 inches; reddish brown (5YR 4/3) shaly heavy silt loam; few fine distinct strong brown (7.5YR 5/6) and brown (7.5YR 5/2) mottles; weak medium platy structure; firm and slightly sticky; few fine pores; patchy clay linings in pores; 33 percent coarse fragments; mostly disintegrating shale fragments in lower 3 inches; mildly alkaline; clear smooth boundary.

R—34 inches; gray (10YR 5/1) and black (10YR 2/1) shale bedrock; thin bedded; weakly calcareous; mildly alkaline.

The solum is 20 to 38 inches thick. In some areas carbonates are in the lower part of the profile. Depth to bedrock is 20 to 40 inches. Coarse fragments are mainly soft and hard shale and make up 5 to 30 percent, by volume, of the solum. The percentage increases with increasing depth. Reaction is medium acid to neutral in the solum and neutral to mildly alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3.

Some areas do not have an A2 horizon. The A2 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma mostly of 3. Faint mottles are in some places. Structure is weak or moderate.

In the B&A horizon, the B and A parts have color and texture similar to those of the B2t and A2 horizons, respectively.

The Bt horizon is heavy silt loam or light silty clay loam, and shaly analogues of these textures are common. This horizon has hue of 10YR to 5YR, value of 3 or 4, and chroma of 3 or 4. Mottles of higher and lower chroma also are present. Structure is moderate or strong medium or coarse subangular blocky. Consistence is friable or firm.

The C horizon is shaly silt loam or shaly light silty clay loam. Structure is weak platy, or the material is massive. Some areas have a B3 horizon instead of a C horizon. In some areas both of these horizons are absent.

The R horizon is mainly mildly alkaline or moderately alkaline shale. In a few areas the bedrock is limestone.

Aurora soils are in a drainage sequence with the somewhat poorly drained Angola soils. Aurora soils commonly are near Wassaic soils. They are similar to Wassaic soils but are slightly wetter and are underlain mostly by shale rather than limestone.

AuB—Aurora silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It is on slightly convex landscapes. It receives little or no runoff from adjacent soils.

Included with this soil in mapping are small areas of well drained and moderately well drained Wassaic soils. Also included are a few small areas of somewhat poorly drained Angola soils along shallow drainageways and in nearly level spots. A few small areas of Lima, Conesus, and Cazenovia soils, which are more than 40 inches deep to bedrock, and a few small areas of Farmington soils, which are less than 20 inches deep to bedrock, are also included.

This soil is suited to cultivated crops, hay and pasture crops, and trees. The hazard of erosion is moderate. Erosion should be controlled to conserve the soil. Management practices that include the use of cover crops and sod crops help to maintain good soil tilth. Droughtiness is a slight problem where the soil depth is less than 25 inches and where there are areas of shallow included soils. Artificial drainage benefits many fields but is difficult to install because of the moderate depth to bedrock.

Moderate depth to bedrock, slow permeability, and temporary seasonal wetness are the main limitations to the use of this soil for most nonfarm purposes. Some areas have a scenic view and are suitable for some recreational purposes. Capability subclass IIw.

AuC—Aurora silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, except it is slightly shallower to bedrock. It is on slightly convex slopes. It commonly receives some runoff from higher adjacent soils.

Included with this soil in mapping are small areas of Cazenovia, Lima, and Conesus soils, which are more than 40 inches deep to bedrock, and small areas of Farmington soils, which are less than 20 inches deep to bedrock. Also included are a few areas of somewhat poorly drained Angola soils that are mostly on the bottom of shallow drainageways. A few areas of soils that are moderately dissected by gullies cutting into the underlying shale bedrock are also included.

This soil is suited to cultivated crops, hay, and pasture crops, and trees. Because runoff is moderate to rapid, the control of erosion is an important management concern in cultivated areas. Where erosion has occurred or where the soil is less than 25 inches deep to bedrock, available water capacity is reduced and droughtiness is a problem. Installation of drainage systems is difficult, if not impractical, because of the moderate depth to bedrock.

Moderate depth to bedrock, slow permeability, and slope are the main limitations to the use of this soil for nonfarm purposes. Some areas have a scenic view and are suitable for some recreational purposes. Capability subclass IIIe.

AuD—Aurora silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, except it is slightly shallower to bedrock and has fewer grayish mottles. This soil commonly is along valley sides. It receives runoff from higher adjacent soils.

Included with this soil in mapping are some areas of severely eroded soils and a few areas of soils that are

moderately dissected by gullies cutting into the underlying shale bedrock. A few areas of shallow Farmington soils, rock outcrops, and small areas of Honeoye and Cazenovia soils that are more than 40 inches deep to bedrock are also included.

This soil is suited to hay crops but is better suited to permanent pasture and trees. Because runoff is rapid, the hazard of erosion is severe. Most cultivated areas are eroded. The use of sod crops is the best protection against erosion. This soil generally is somewhat more droughty than less sloping phases of Aurora soils, because it has a shallower root zone and loses an excessive amount of water through runoff. The operation of heavy equipment is limited by slope.

Depth to bedrock and slope are the main limitations to most nonfarm uses of this soil. Some areas have potential as a source of quarried shale. Capability subclass IVe.

Bath series

The Bath series consists of deep, well drained soils that have a fragipan at a depth of more than 36 inches. These gently sloping to steep soils formed in glacial till derived from sandstone, siltstone, and shale. They are on the higher parts of the dissected upland plateau, mostly at an elevation of more than 1,500 feet.

In a representative profile the surface layer is dark brown channery silt loam 7 inches thick. The upper part of the subsoil is friable, yellowish brown channery silt loam. The lower part of the subsoil extends to a depth of 55 inches and is a fragipan of firm, dark brown channery loam.

A seasonal high water table is perched above the slowly permeable fragipan for very brief periods early in spring. Permeability is moderate in the surface layer and upper part of the subsoil. Roots readily penetrate the zone above the dense fragipan, but almost none penetrate the fragipan. Available water capacity is moderate. Because these soils are at a relatively high elevation, they have a somewhat shorter growing season than many of the well drained soils in the county. The natural supply of nitrogen is medium, and supply of phosphorus is low. The content of available potassium is medium to low. The natural content of lime is low.

These soils are used for row crops, hay, and pasture crops and trees. In a few areas they are idle. The slowly permeable fragipan and the presence of coarse fragments are limitations to many nonfarm uses of these soils.

Representative profile of Bath channery silt loam, 8 to 15 percent slopes, in a cultivated field 100 feet south of Baldwin Road and 0.7 mile east of Academy Road in the town of Brookfield:

Ap—0 to 7 inches; dark brown (10YR 3/3) channery silt loam, brown (10YR 4/3) crushed; moderate medium granular structure; friable; many fine roots; 15 percent coarse fragments; slightly acid; abrupt smooth boundary.

B2—7 to 28 inches; yellowish brown (10YR 5/6) channery silt loam; weak medium and fine subangular blocky structure; very friable in upper part grading to friable in lower part; common fine roots; many fine and few medium pores; 15 percent coarse fragments; medium acid grading to strongly acid in lower part; clear smooth boundary.

A'2—28 to 30 inches; brown (10YR 5/3) channery loam; few fine faint yellowish brown (10YR 5/6) mottles; weak medium and thin platy structure; firm; few fine roots; many fine pores; few fine grayish brown (10YR 5/2) skeletons; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B'x—30 to 55 inches; dark brown (10YR 4/3) channery loam; weak very coarse prismatic structure parting to weak thick platy; firm and brittle; common fine pores; few thin clay linings in pores; prism faces 1/2-inch wide are light brownish gray (10YR 6/2) with rinds of yellowish brown (10YR 5/8) 1/8-inch wide; few thin patchy clay films on faces of plates; 25 percent coarse fragments, the percentage increasing with depth; strongly acid.

The solum is 40 to 70 inches thick, and depth to the fragipan is 26 to 36 inches. Depth to free carbonates and to bedrock is more than 60 inches. Coarse fragments are mainly flat, angular siltstone and sandstone and make up 5 to 35 percent, by volume, of the upper part of the solum and as much as 60 percent of the fragipan and substratum. Unless the soil is limed, reaction is very strongly acid to medium acid above the fragipan and strongly acid to slightly acid in the fragipan.

In some areas there is an A1 horizon. The Ap or A1 horizon is mainly channery silt loam but is flaggy silt loam in some places. The A1 horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3.

The B2 horizon is silt loam or loam, and channery and gravelly analogues are common. This horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6.

In some areas there is no A'2 horizon. The A'2 horizon, where present, has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3. High chroma mottles are in some profiles. Consistence is friable or firm.

The B'x horizon is loam or silt loam and includes channery and very channery analogues. It has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 5. Prism faces have higher value and lower chroma. Structure is platy within very coarse prisms, or the material is massive. Consistence is very firm or firm and is brittle. Mottles are in this horizon in some places.

The C horizon has color and texture similar to those of the B'x horizon.

Bath soils are in a drainage sequence with the moderately well drained Mardin soils, the somewhat poorly drained Volusia soils, and the poorly drained Chippewa soils. They commonly are near the well drained Stockbridge soils. Bath soils are similar to Stockbridge soils but have a fragipan, which those soils do not have.

BaB—Bath channery silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, except the surface layer is slightly thicker and mottles are more distinct just above the fragipan. This soil is on convex hilltops and the smooth upper part of valley sides. It receives little or no runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of somewhat poorly drained Volusia soils and of moderately well drained Mardin soils along field drainageways and in slight depressions. Also included are a few areas of a soil that is similar to this Bath soil but is slightly shallower to the fragipan. A few small areas of Lordstown soils, which are less than 40 inches deep to bedrock, are also included.

This soil is suited to cultivated crops, hay and pasture crops, and trees. Crops that tolerate low lime conditions, for example, potatoes, grow especially well. The hazard of erosion is slight to moderate in cultivated areas. Erosion can be controlled by contour tillage, use of cover crops, and minimum tillage. Flat coarse fragments slightly

hinder precision tillage operations and cause excessive wear to machinery.

Many areas of this soil are well suited to homesites. However, the slowly permeable fragipan is a limitation to use of this soil for septic effluent fields. The presence of coarse fragments and slope are limitations to many other nonfarm uses of this soil. Capability subclass IIe.

BaC—Bath channery silt loam, 8 to 15 percent slopes. This sloping soil has the profile described as representative of the series. It is on slightly convex hillsides and the upper part of valley sides. It receives a small amount of runoff from higher adjacent soils. Some areas of this soil are dissected by shallow drainageways.

Included with this soil in mapping are small areas of somewhat poorly drained Volusia soils in shallow drainageways and moderately well drained Mardin soils in slightly concave areas. Also included are a few small areas of severely eroded soils and a few areas of soils that have bedrock within 40 inches of the surface. A few areas of a soil that is similar to this Bath soil but has a fragipan at a depth of 22 to 26 inches are also included.

This soil is suited to some cultivated crops and is well suited to hay and pasture crops and trees. Because runoff is moderately rapid, the hazard of erosion is moderate. Conservation practices including contour tillage, stripcropping on long slopes, and use of cover crops help to control erosion and conserve moisture. Coarse fragments hinder some planting and harvesting operations.

The slowly permeable fragipan and substratum, slope, and presence of coarse fragments are limitations to most nonfarm uses of this soil that require good drainage. Capability subclass IIIe.

BaD—Bath channery silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, except the content of coarse fragments in the surface layer is higher and mottles generally are not present above the fragipan. This soil is on the sides of long, narrow ridges and on dissected valley sides. This soil generally receives runoff from higher soils.

Included with this soil in mapping are a few areas of steep soils along incised drainageways. Also included are a few areas of severely eroded soils and a few areas of soils that are moderately deep to bedrock. Some areas of a soil that is similar to this Bath soil but that has a fragipan at a depth of 22 to 26 inches are also included.

This soil is suited to hay and pasture crops and trees. Cultivated crops can be grown, but operation of equipment is difficult and the hazard of erosion is severe. If cultivated crops are grown, intensive management is needed to conserve soil and moisture. Management practices should include contour tillage, stripcropping, use of cover crops, minimum tillage, and use of a high proportion of sod crops in the cropping system. Droughtiness in midsummer is a slightly greater problem on this soil than on less sloping phases of Bath soils. Coarse fragments hinder the operation of some machinery.

Slope and the slowly permeable fragipan and substratum are limitations to most nonfarm uses of this soil. In some areas this soil has potential for recreational developments, for example, ski slopes, or for development of wildlife habitat. Capability subclass IVe.

BCE—Bath soils, steep. These soils have a profile similar to the one described as representative of the series, except the surface layer and subsoil are slightly thinner and are more variable in texture. The surface layer is channery silt loam or flaggy silt loam. This map unit is on valley sides and narrow upland hillsides. Slopes range from 25 to 50 percent. Some of the dissecting drainageways are deep.

Included with these soils in mapping are some areas of Stockbridge soils, which do not have a fragipan. Also included are a few areas of severely eroded soils and a few small areas of soils that have bedrock at a depth of less than 40 inches. A few large areas of a well drained soil that is similar to this Bath soil but that has a fragipan at a depth of 20 to 26 inches are also included.

These soils are not suited to cultivated crops. They are suited to permanent pasture but are better suited to trees. Because of slope, operation of machinery is extremely hazardous and difficult. The hazard of erosion is very severe in unprotected areas. These soils are droughtier than less sloping phases of Bath soils because of rapid runoff and low available water capacity.

Slope and the slow permeability in the fragipan are the main limitations to most nonfarm uses of these soils. Some areas of these soils have potential for some recreational developments, for example, ski slopes. Capability subclass VIe.

Camillus series

The Camillus series consists of moderately deep, well drained and moderately well drained soils. These soils formed in semiresidual material that was weathered from soft silty shale and was influenced by an admixture of glacial till. They are gently sloping and sloping and are on the northern front of the upland plateau.

In a representative profile the surface layer is dark grayish brown silt loam 8 inches thick. The upper part of the subsoil is friable, brown silt loam 10 inches thick, and the lower part is friable, mottled, brown shaly silt loam 9 inches thick. The substratum is firm, dark grayish brown, decomposed silty shale. Gray, partially disintegrated, soft shale is at a depth of 38 inches.

A seasonal high water table commonly is perched above the bedrock for brief periods early in spring, especially in less sloping areas. Bedrock is at a depth of 20 to 40 inches. Permeability is moderate. Roots are confined to the 20- to 40-inch zone above the decomposing shale bedrock. Available water capacity is moderate. The natural supply of nitrogen is medium, and supply of phosphorus is low. Content of available potassium is high. The natural content of lime is medium to high.

Many areas of these soils are used for row crops and hay crops. Some areas are used for pasture, especially more sloping areas. Moderate depth to soft shale bedrock is the principal limitation to nonfarm uses of these soils.

Representative profile of Camillus silt loam, 8 to 15 percent slopes, in a hayfield 30 feet north of Mount Hope Avenue and 90 yards east of Lincoln Township line in the town of Oneida:

Ap—0 to 8 inches, dark grayish brown (10YR 4/2) silt loam; weak medium and fine subangular blocky structure parting to weak fine granular; friable; many fine roots; 10 percent soft coarse fragments of shale and 2 percent hard coarse fragments; neutral; abrupt smooth boundary.

B21—8 to 18 inches; brown (10YR 5/3) silt loam; weak medium and fine subangular blocky structure; friable; many fine roots; common fine pores; thin patchy clay linings in pores; 12 percent soft coarse fragments and 2 percent hard; slightly acid; clear wavy boundary.

B22—18 to 27 inches; brown (10YR 4/3) shaly silt loam; weak medium and thick platy structure parting to weak very fine subangular blocky; friable; common fine roots; many fine pores; thin discontinuous patchy clay linings in pores; thin patchy clay films on faces of 20 percent of peds; few olive gray (5Y 5/2) patches derived from decomposing shale fragments; 20 percent soft coarse fragments and 3 percent hard; neutral; gradual wavy boundary.

C—27 to 38 inches; dark grayish brown (10YR 4/2) decomposed silty shale; moderate medium and thick platy structure inherited from rock; firm in place, friable when removed; few roots in upper 4 inches; 40 percent soft shale fragments, the percentage increasing with depth; mildly alkaline; gradual wavy boundary.

R—38 inches; gray (5Y 5/1) medium and thin-bedded partially disintegrated soft shale bedrock; weakly calcareous; mildly alkaline.

The solum is 20 to 30 inches thick. Depth to decomposing soft shale bedrock is 20 to 40 inches. Coarse fragments are mainly soft shale. They make up 0 to 20 percent, by volume, of the upper part of the solum and as much as 60 percent of the lower part of the substratum. Hard shale fragments make up 0 to 10 percent of the solum. Reaction is medium acid to neutral in the solum and neutral to mildly alkaline in the substratum.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2.

The B horizon is dominantly silt loam, and shaly analogues are common in the lower part. This horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. High chroma mottles are below a depth of 16 inches in some places. Structure is weak or moderate subangular blocky or platy. Consistence is friable or very friable.

The C horizon is mainly silt loam and has a high content of decomposing soft shale fragments. This horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Consistence is friable or firm.

The soft shale bedrock becomes harder with increasing depth. At a depth of about 5 or 6 feet, the bedrock is hard, unweathered shale.

Camillus soils are near the moderately deep Lairdsville soils but have a coarser textured subsoil than those soils. They are also near Cazenovia soils and Ontario Variant soils but are shallower to bedrock and have fewer hard coarse fragments than those soils. Camillus soils have no drainage associates in the county.

CaB—Camillus silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, except it has mottles in the lower part of the subsoil. This soil is in the drier half of the moderately well drained class and in the wetter half of the well drained class. This soil is on gently undulating landscapes where slopes are short and complex and on smooth, broad landscapes where slopes are longer and more uniform. This soil receives little runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of a soil in shallow depressions and along drainageways, that is similar to this Camillus soil but is somewhat poorly drained. Also included are a few small areas of finer textured Lairdsville soils and deep Ontario Variant soils.

This soil is suited to many cultivated crops, hay and pasture crops, trees, and some vegetable crops. Alfalfa for hay or forage grows exceptionally well on this soil. The control of erosion is the principal concern of management, especially on long slopes. Use of cover crops, return of crop residue to the soil, minimum tillage, and cross slope tillage where feasible are practices that reduce erosion. Randomly placed drains for wet spots can be used to improve many areas. For the installation of subsurface drains, the shale bedrock is easy to excavate where it is hard. Brief seasonal wetness slightly delays tillage operations in spring.

Many areas of this soil have a scenic view and have potential as homesites. The soft, rippable shale bedrock is a minor limitation to the use of this soil for dwellings with basements. Brief seasonal wetness is a limitation to some nonfarm uses. Capability subclass IIe.

CaC—Camillus silt loam, 8 to 15 percent slopes. This sloping soil has the profile described as representative of the series. It is well drained. Slopes are slightly convex. This soil commonly receives some runoff from higher adjacent soils.

Included with this soil in mapping are a few large areas of eroded soils and a few small areas of moderately steep soils that are on short slopes. Also included are a few small areas of finer textured Lairdsville soils.

This soil is suited to cultivated crops, pasture, and trees. It is better suited to hay and pasture crops than to cultivated crops because of the severe hazard of erosion. Alfalfa grows especially well on this soil. If cultivated crops are grown, management practices should include use of cover crops, return of crop residue to the soil, minimum tillage, and contour tillage and stripcropping where practical. These practices not only help to control erosion but also help to reduce runoff, thus conserving moisture. Because the dissecting drainageways in some areas are moderately closely spaced, the operation of farm equipment is somewhat hazardous. In other areas, however, this soil is not difficult to till.

Slope and moderate depth to soft shale bedrock are limitations to some nonfarm uses of this soil. Control of erosion is important on construction sites. Capability subclass IIIe.

Canandaigua series

The Canandaigua series consists of deep, poorly drained and very poorly drained soils. These soils formed in glaciolacustrine (lake-laid) deposits that are mainly silt and have a smaller amount of clay. They are in low, nearly level areas on the lake plain and in a few depressions on the upland plateau.

In a representative profile the surface layer is very dark grayish brown silt loam 8 inches thick. The subsoil is friable, mottled heavy silt loam 18 inches thick. The upper part of the subsoil is grayish brown, and the lower part is gray. The substratum extends to a depth of 62 inches. The upper part of the substratum is mottled, grayish brown light silt loam, and the lower part is light gray, stratified very fine sandy loam, silt loam, and very fine silt.

A high water table is at or near the surface for long periods in spring and during periods of heavy rain. In a few areas runoff is ponded for brief periods early in spring. Permeability is moderately slow in the subsoil and substratum. Unless the soil is drained, most roots are confined by the water table to the surface layer and upper few inches of the subsoil. Although the available water capacity is limited in this zone, the supply of moisture generally is sufficient to sustain plant growth. In drained areas, roots extend more deeply and available water capacity is high. The natural content of nitrogen is high, but nitrogen is released slowly to plants when the soils are damp and cold in spring. The natural supply of phosphorus is low, and content of available potassium is medium to high. The natural content of lime is medium to high.

Most areas of these soils are used for trees and poor quality pasture or are idle. A few areas are drained and are used for cultivated crops or hay. Prolonged wetness is the main limitation to most nonfarm uses of these soils.

Representative profile of Canandaigua silt loam, in a meadow 250 yards east of Petrie Road and 1/8 mile south of Shackelton Point Road in the town of Sullivan:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; few fine distinct strong brown (7.5YR 5/6) mottles in lower 2 inches; moderate medium and fine granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

B21g—8 to 20 inches; grayish brown (10YR 5/2) heavy silt loam; many (35 percent) medium distinct strong brown (7.5YR 5/6) and few fine reddish brown (5YR 5/3) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; friable and slightly plastic; common fine roots in upper part; common fine pores; thin clay linings in pores; gray (10YR 6/1) patches on faces of peds; few vertical dark grayish brown (10YR 4/2) macropores; neutral; gradual wavy boundary.

B22g—20 to 26 inches; gray (10YR 5/1) heavy silt loam; common medium distinct light gray (5YR 6/1) threadlike mottles and many large distinct reddish brown (5YR 4/4) and strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak thin platy; friable and slightly plastic; common fine pores; thin patchy clay films lining many pores and on some vertical faces of peds; neutral; gradual wavy boundary.

C1—26 to 36 inches; grayish brown (10YR 5/2) light silt loam; many medium distinct strong brown (7.5YR 5/6), reddish brown (5YR 4/4), and light olive brown (2.5Y 5/4) mottles; moderate medium and thin platy structure; friable, firm in place; common fine pores; few light gray (5Y 6/1) lime streaks; weakly calcareous; mildly alkaline; gradual wavy boundary.

C2—36 to 62 inches; light gray (10YR 6/1) thinly stratified very fine sandy loam, silt loam, and very fine silt; common mottles of varied colors along bedding planes; moderate medium platy structure; friable, firm in place; strongly calcareous; moderately alkaline.

The solum is 20 to 36 inches thick, and depth to carbonates is 20 to 40 inches. Depth to bedrock is more than 5 feet. Coarse fragments generally are absent in the upper 40 inches, except gravel or stones are in some places. Reaction is medium acid to neutral in the upper part of the solum and slightly acid to mildly alkaline in the lower part of the solum.

In some areas there is an A1 horizon. The Ap or A1 horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. Structure is granular or subangular blocky.

The B horizon ranges from very fine sandy loam to silty clay loam but is mostly silt loam. This horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 1 or 2. High chroma mottles are common to many. Structure is weak or moderate coarse or very coarse prismatic that parts to moderate or weak subangular blocky or platy. Consistence is friable or firm.

The C horizon commonly is stratified with thin layers that range from very fine sandy loam to silt loam. Contrasting coarser material is at a depth of more than 40 inches in some areas.

Canandaigua soils are in a drainage sequence with the somewhat poorly drained Niagara soils and the moderately well drained Collamer soils. They are similar to Raynham soils but have a finer textured subsoil. They commonly are near Lakemont soils but have a coarser textured subsoil than those soils.

Cd—Canandaigua silt loam. This soil is nearly level soil. It is in low areas and slight depressions that have silty deposits. Slopes are mainly 0 to 1 percent but range to as much as 3 percent in some areas. This soil is mostly poorly drained, but in some areas it is very poorly drained. It receives runoff from higher adjacent soils.

Included with this soil in mapping are small areas of somewhat poorly drained Niagara soils. Also included are a soil that has a surface layer of mucky silt loam in a few depressions and potholes and a few areas of a soil that has a subsoil of sandy clay loam. A few small areas of a soil that has contrasting coarser textured material within a depth of 40 inches are also included.

If this soil is adequately drained and protected from ponding, it is suited to cultivated crops and some vegetable crops. Use of a combination of subsurface and surface drains generally is most effective, if suitable outlets are available. Because water percolates through this soil moderately slowly, drains should be closely spaced in some areas. Minimum tillage and use of cover crops are practices that maintain good tilth. In undrained areas this soil is suited to water-tolerant pasture plants and trees.

Prolonged wetness, low bearing strength, and moderately slow permeability are limitations to the use of this soil for most nonfarm purposes. In some areas this soil has potential for development of wetland wildlife habitat. Capability subclass IVw.

Carlisle series

The Carlisle series consists of deep, very poorly drained organic soils that formed in decomposed woody and herbaceous plant remains. These soils are nearly level and are in large, low depressions on the upland plateau and in a few small areas on the lake plain.

In a representative profile the surface layer is black muck (sapric material) 7 inches thick. The underlying organic layers, to a depth of 63 inches, are black and dark reddish brown, well decomposed muck (sapric material)

that is friable in the upper part and grades to firm in the lower part. The substratum, to a depth of 73 inches, is firm, gray silt.

In undrained areas the water table is at or near the surface throughout much of the year. Most undrained areas are ponded or flooded in the spring. Permeability is rapid. Rooting depth is confined to the zone above the water table, which is mainly the surface layer in undrained areas. Available water capacity is high. The total content of nitrogen is high, but nitrogen is released slowly to plants when the soil is damp and cold. The natural content of lime is medium to low.

Most areas of these soils are undrained and are used for water-tolerant tree and plant species, for example, cedar and cattail. A few areas are drained and are used for vegetables and root crops. The prolonged high water table and hazard of flooding are the main limitations to most nonfarm uses of these soils.

Representative profile of Carlisle muck, in woodland 100 feet west of Swamp Road and 1.3 miles south of Gill Road in the town of Eaton:

Oa1—0 to 7 inches; black (10YR 2/1) sapric material (muck), broken face and rubbed; 10 percent fibers, about 1 percent rubbed; weak fine granular structure; friable and slightly sticky; many fine and few medium live roots; fibers are mostly herbaceous; 20 percent mineral soil material; 10 percent woody fragments; slightly acid; gradual smooth boundary.

Oa2—7 to 14 inches; black (10YR 2/1) sapric material (muck), very dark gray (10YR 3/1) rubbed; 15 percent fibers, about 2 percent rubbed; weak coarse subangular blocky structure; friable and slightly sticky; few fine live roots in upper part; recognizable fibers are primarily herbaceous; 40 percent mineral soil material; 10 percent woody fragments; slightly acid; clear smooth boundary.

Oa3—14 to 27 inches; dark reddish brown (5YR 2/2) sapric material (muck), broken face and rubbed; 20 percent fibers, less than 3 percent rubbed; weak coarse subangular blocky structure; friable and slightly sticky; fine woody fragments within a matrix of herbaceous fibers; 20 percent mineral soil material; 25 percent woody fragments and few pine logs; slightly acid; clear smooth boundary.

Oa4—27 to 54 inches; black (5YR 2/1) sapric material (muck), dark reddish brown (5YR 2/2) rubbed; 15 percent fibers, less than 3 percent rubbed; moderate coarse and medium subangular blocky structure grading to massive in the lower part; firm and nonsticky; fibers are herbaceous and woody; 20 percent mineral soil material; 20 percent woody fragments including tan-colored wood chips; slightly acid grading to neutral; clear smooth boundary.

Oa5—54 to 63 inches; black (N 2/10) sapric material (muck), black (10YR 2/1) rubbed; 10 percent fibers, less than 1 percent rubbed; massive; firm and nonsticky; fibers are herbaceous and, less recognizably, woody; 50 percent mineral soil material; 5 percent woody fragments; neutral; abrupt smooth boundary.

IICg—63 to 73 inches; gray (N 5/0) silt; massive; firm and slightly sticky; neutral.

The organic deposits are more than 51 inches thick. Depth to bedrock is more than 8 feet. Woody fragments are common in most profiles and make up as much as 30 percent, by volume, of some subsurface layers. They are mainly branches, stems, bark chips, and logs. Reaction is medium acid to neutral throughout the profile. The fibers are derived from herbaceous and woody plant tissue, but the herbaceous fibers are easier to recognize.

The surface layer (Oa1 or Oap horizon) has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1. Structure is weak or moderate granular.

The subsurface and bottom layers are mainly sapric material, but some profiles have thin layers of hemic material. These layers have hue of 5YR to 10YR or are neutral, and they have value of 2 or 3 and chroma of 0 to 2. Rubbed fiber content is less than 10 percent. Structure is granular or subangular blocky and commonly grades to massive or platy with increasing depth. Consistence is firm or friable.

The IICg (mineral) horizon is mostly loam or silt. It has hue of 10YR or 5YR or is neutral, and it has value of 4 or 5 and chroma of 0 or 1. Consistence is friable or firm.

Carlisle soils are similar to and commonly are near Palms soils but are deeper to mineral soil deposits than those soils. They are similar to Willette soils, which have clayey deposits underlying the organic layers, but are deeper to mineral soil material than Willette soils.

Ce—Carlisle muck. This soil is nearly level. It formed in decomposed organic material that is 51 inches thick or more and that overlies mineral soil deposits. It is in low depressions and basins. Slopes are mostly 1 percent or less. This soil receives runoff from higher adjacent mineral soils.

Included with this soil in mapping is Palms muck in small areas where the organic deposits are thinner. Also included are a few small spots of soils that have thin layers of marl in the lower part of the organic material. A few small areas of a soil that is adjacent to active streams and has a thin mantle of silty alluvium overlying the organic deposits are also included.

If adequately drained, this soil is well suited to vegetables and root crops. Many areas are difficult to drain because of a lack of suitable outlets. Pumping and diking are feasible in some areas, because this soil is suited to high value crops and has a relatively long productive life. If this soil is drained, the oxidation of the organic material and soil blowing are hazards. Minimum tillage and regulation of the water table help to reduce oxidation. Planting windbreaks around field borders and using cover crops are practices that help to reduce soil blowing. In undrained areas this soil provides cover for wildlife. Timber production is poor.

The prolonged high water table, hazard of flooding, and poor stability are limitations to most nonfarm uses of this soil. In some areas this soil has potential for development of habitat for nesting waterfowl, birds, and other animals that frequent marsh areas. Capability subclass IIIw.

Cazenovia series

The Cazenovia series consists of deep, well drained and moderately well drained soils. These soils formed in glacial till derived mainly from limestone and red shale. The till commonly is mixed with reglaciated lacustrine sediment. These soils are gently sloping to steep and are in islandlike areas on the lake plain and on the low upland plateau.

In a representative profile the surface layer is dark brown silt loam 9 inches thick. The subsurface layer is leached, brown silt loam 2 inches thick. The subsoil is firm and reddish brown and extends to a depth of 29 inches. The upper 13 inches of the subsoil is silty clay loam that has faint mottles in the lower part. The lower 5 inches of the subsoil is gravelly silty clay loam that has faint mottles. The substratum, to a depth of 52 inches, is very firm, brown gravelly heavy silt loam.

A temporary seasonal high water table commonly is perched above the slowly permeable substratum for brief periods in spring, especially in less sloping areas. Permeability is moderate in the surface layer and moderately slow in the subsoil. Most roots are confined to the zone above the dense, calcareous substratum. Available water capacity is moderate to high. The natural supply of nitrogen is medium. The supply of phosphorus is low, and the content of available potassium is high. The natural content of lime is medium to high.

Most areas of these soils are in cultivated crops and hay and pasture crops. A few areas are idle or are in trees. Temporary seasonal wetness and slow permeability in the substratum are the main limitations to most nonfarm uses of these soils.

Representative profile of Cazenovia silt loam, 3 to 8 percent slopes, in a pasture 30 feet north of Timmerman Road and 1/4 mile east of its intersection with Eddy Road in the town of Lincoln:

Ap—0 to 9 inches; dark brown (7.5YR 4/2) silt loam; rubbed; moderate fine and medium granular structure; friable; many fine and medium roots; 10 percent coarse fragments; slightly acid; abrupt smooth boundary.

A2—9 to 11 inches; brown (10YR 5/3) silt loam; weak fine and medium granular structure; friable; many fine and common medium roots; common fine pores; few dark brown (7.5YR 4/2) vertical macropores; 5 percent coarse fragments; slightly acid; clear wavy boundary.

B&A—11 to 15 inches; reddish brown (5YR 4/3) light silty clay loam; moderate fine and medium subangular blocky structure; firm; common fine roots; common fine pores; clay linings in interiors of peds; light reddish brown (5YR 6/3) silt coatings more than 1 millimeter thick on faces of peds; pinkish gray (5YR 7/2) dry; few dark brown (7.5YR 4/2) vertical macropores; 8 percent coarse fragments; slightly acid; clear wavy boundary.

B21t—15 to 24 inches; reddish brown (5YR 5/3) silty clay loam; few fine faint reddish brown (5YR 5/4) and yellowish red (5YR 5/6) mottles; weak very coarse prismatic structure parting to strong medium subangular blocky; firm; few fine roots; common fine pores; thick clay linings in pores; thick patchy clay films on faces of peds; 10 percent coarse fragments; neutral; gradual wavy boundary.

B22t—24 to 29 inches; reddish brown (5YR 4/3) gravelly silty clay loam; few fine faint yellowish red (5YR 5/6) mottles; strong coarse and medium subangular blocky structure; firm; few fine pores; clay linings in pores; thin patchy clay films on faces of peds; 20 percent coarse fragments; mildly alkaline; gradual wavy boundary.

C—29 to 52 inches; brown (7.5YR 4/2 to 5/2) gravelly heavy silt loam; few fine faint reddish brown (5YR 4/4) mottles; massive; very firm; few pores; 30 percent coarse fragments; strongly calcareous; moderately alkaline.

The thickness of the solum and the depth to carbonates are 20 to 40 inches. In most areas depth to bedrock is more than 5 feet. Coarse fragments are mainly shale chips and gravel; they make up 2 to 25 percent, by volume, of the solum and as much as 35 percent of the substratum. Reaction is medium acid to neutral in the upper part of the solum and commonly is less acid with increasing depth.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3.

The A2 horizon has hue of 10YR to 5YR, value of 5 or 6, and chroma of 2 or 3. In some areas there is no A2 horizon.

The B&A horizon is clay loam or light silty clay loam.

The B2t horizon has hue of 7.5YR to 2.5YR, value of 4 or 5, and chroma of 3 or 4. It is silty clay loam or clay loam, and gravelly analogues are in some places. Faint high chroma mottles are in some places. Structure is mainly moderate or strong subangular blocky. Consistence is friable or firm.

The C horizon ranges from loam to light silty clay loam and generally has gravelly analogues. Consistence is firm or very firm.

Cazenovia soils are in a drainage sequence with the somewhat poorly drained and moderately well drained Ovid soils. Cazenovia soils are similar to Aurora soils but do not have bedrock within a depth of 40 inches. They commonly are near Honeoye soils. They are similar to Honeoye soils but have a finer textured subsoil.

CfB—Cazenovia silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. Slopes are slightly convex. This soil receives little or no runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of somewhat poorly drained and moderately well drained Ovid soils in nearly level places and along field drainageways. Also included are a few areas of Schoharie soils, which have a higher content of clay and a lower content of coarse fragments than this Cazenovia soil.

This soil is suited to cultivated crops and hay and pasture crops. Temporary seasonal wetness briefly delays tillage in spring. Randomly placed subsurface drains for wet spots improve many areas. The hazard of erosion is slight to moderate. Erosion can be controlled by minimum tillage, use of cover crops, and contour tillage. These practices also help to preserve good soil tilth, which is difficult to maintain in intensively cultivated areas. Poor tilth causes clodding and crusting of the soil surface.

Slow permeability in the substratum and temporary seasonal wetness are limitations to the use of this soil for most nonfarm purposes. Selecting the proper site and providing drainage around foundations can reduce the effects of these limitations if the soil is used as homesites. Capability subclass IIw.

CfC—Cazenovia silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, except it has faint mottles at a greater depth. Slopes are slightly convex. This soil receives little runoff from higher adjacent soils. It is well drained and moderately well drained.

Included with this soil in mapping are a few small areas of somewhat poorly drained and moderately well drained Ovid soils along drainageways. A few small areas of severely eroded soils are also included.

This soil is suited to some cultivated crops, hay and pasture crops, and trees. The hazard of erosion is moderate to severe in unprotected areas. Contour tillage, stripcropping, and use of cover crops are practices that help to reduce erosion, maintain good soil tilth, and conserve moisture. Including sod crops in the cropping system also helps to prevent erosion and reduces surface crusting and clodding. Interceptor drains that divert runoff and seepage can be used to benefit many areas.

Slope and slow permeability in the substratum are limitations to most nonfarm uses of this soil. Excessive grading may increase seasonal wetness and reduce permeability. Capability subclass IIIe.

CfC3—Cazenovia silt loam, 8 to 15 percent slopes, severely eroded. This sloping soil has a profile similar to the one described as representative of the series, except

the surface layer and subsoil are thinner because of erosion. Slopes are slightly convex or plane. This soil receives runoff from higher adjacent soils. In many areas slopes are long and are dissected by rills and shallow gullies.

Included with this soil in mapping are a few areas of very severely eroded soils that have silty clay loam subsoil material exposed at the surface. Also included are somewhat poorly drained and moderately well drained Ovid soils in a few small drainageways.

This eroded soil has limited potential for cultivated crops. Runoff is rapid, and the hazard of further erosion is severe in unprotected areas. If cultivated crops are grown, the cropping system should include a high proportion of sod crops and a maximum of conservation practices. Many of these conservation practices increase organic-matter content and improve soil tilth. Careful management is required to reduce surface crusting and clodding. Available water capacity is lower in this soil than in uneroded phases of Cazenovia soils.

Slope and slow permeability in the substratum are limitations to most nonfarm uses of this soil. Precaution should be taken at construction sites to prevent further erosion. Capability subclass IVe.

CfD—Cazenovia silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, except the depth to the substratum is less and mottles are absent. This soil commonly is on valley sides. It receives runoff from higher adjacent soils. Many areas are dissected by closely spaced drainageways.

Included with this soil in mapping are some areas of severely eroded and very severely eroded soils, mostly where crops have been grown frequently. Steep soils in a few areas along dissecting drainageways and a few areas of finer textured Schoharie soils are also included.

This soil is better suited to hay and pasture crops or trees than to cultivated crops. Tillage is moderately difficult and hazardous because of slope, and the hazard of erosion is severe in unprotected areas. In cultivated areas conservation practices are required that include contour tillage, use of cover crops, stripcropping on long slopes, and use of a high proportion of sod crops in the cropping system. These practices also conserve moisture and help to reduce surface crusting and clodding. Because of rapid runoff, droughtiness is a greater problem on this soil than on less sloping phases of Cazenovia soils.

Slope is the principal limitation to most nonfarm uses of this soil. Some areas are best suited to development of wildlife habitat or to reforestation. Capability subclass IVe.

Chenango series

The Chenango series consists of deep, well drained and somewhat excessively drained soils. These soils formed in old alluvial fan deposits that have a high content of sandstone and siltstone channery fragments. They are gently sloping and are at the confluence of high gradient upland streams and larger valley streams on the upland plateau.

In a representative profile the surface layer is very dark grayish brown channery silt loam 10 inches thick. The upper part of the subsoil is very friable, brown very channery silt loam 14 inches thick, and the lower part is very friable, brown very channery fine sandy loam 10 inches thick. The substratum, to a depth of 60 inches, is grayish brown very channery loamy sand.

The seasonal high water table generally is deep in the substratum, but some water movement occurs in the substratum during periods of peak runoff and high stream discharge. Permeability is moderate or moderately rapid in the surface layer and subsoil and is rapid in the substratum. Roots generally are not restricted, but most roots are in the upper 3 feet of soil. Available water capacity is low to moderate. The natural supply of nitrogen is medium, supply of phosphorus is very low, and content of available potassium is medium to low. The natural content of lime is low.

Many areas of these soils are used for cultivated crops and hay. Rare flooding and the presence of coarse fragments are the principal limitations to some nonfarm uses of these soils.

Representative profile of Chenango channery silt loam, fan, 3 to 8 percent slopes, in a hayfield 300 yards east of Academy Road and 0.6 mile south of Stanbro Road in the town of Brookfield:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) channery silt loam, dark grayish brown (10YR 4/2) rubbed; moderate fine and medium granular structure; friable; many fine and few medium roots; 20 percent coarse fragments; slightly acid (limed); clear smooth boundary.

B21—10 to 24 inches; brown (10YR 5/3) very channery silt loam; very weak fine and medium subangular blocky structure; very friable; many fine pores; common dark grayish brown (10YR 4/2) organic fillings in earthworm channels and old root channels; 35 percent coarse fragments; medium acid (limed); gradual wavy boundary.

B22—24 to 34 inches; brown (10YR 4/3) very channery fine sandy loam; massive; very friable; common fine roots; common fine pores; thin discontinuous clay flows around some coarse fragments; 40 percent coarse fragments; few flagstones; strongly acid grading to medium acid; gradual wavy boundary.

IIC—34 to 60 inches; grayish brown (10YR 5/2) very channery loamy sand; single grain; loose; few roots in upper part; 60 percent coarse fragments; few flagstones; slight downstream imbrication of coarse fragments; medium acid.

The solum is 28 to 36 inches thick, and depth to bedrock is more than 8 feet. Coarse fragments are mainly sandstone and siltstone, but most profiles have some acid shale fragments. Coarse fragments make up an average of more than 35 percent, by volume, of the soil material between a depth of 10 and 40 inches, and the content commonly increases to as much as 70 percent at a greater depth. Unless the soil is limed, reaction is very strongly acid or strongly acid in the upper part of the solum and very strongly acid to medium acid in the lower part of the solum. Reaction commonly grades to slightly acid deep in the substratum.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Consistence is very friable or friable.

The B horizon is mainly silt loam or loam, and in some places it is fine sandy loam in the lower part. Hue is mainly 10YR, and in a few profiles it is 7.5YR. Value is 4 or 5, and chroma is 3 or 4. Structure is very weak or absent. Consistence is very friable or friable.

The C horizon is very channery or very gravelly and has a high content of sand. Shale chips are dominant in some areas. Color is similar to that of the B horizon, but chroma commonly is darker and is mostly 2. Imbrication is evident in many areas.

Chenango soils are similar to Herkimer soils but are coarser textured and more acid than those soils. They are similar to and near Howard soils on gravelly terraces but have more channery fragments and fewer limestone pebbles than those soils.

CgB—Chenango channery silt loam, fan, 3 to 8 percent slopes. This gently sloping soil formed in old alluvial fan deposits that were built by high velocity side streams entering main valleys during postglacial periods. This soil generally receives some runoff from adjacent higher soils. Most areas are triangular or fan shaped.

Included with this soil in mapping are areas of nearly level soils that are similar to this Chenango soil but are moderately well drained. Also included, in places where side streams have a steeper gradient, are small areas of soils that have slopes of 8 to 10 percent. Near the lower end of some fans, in places where the stream gradient decreases, a few small areas of alluvial Middlebury and Teel soils are also included.

This soil is suited to cultivated crops, hay and pasture crops, and trees. Because this soil commonly is at a relatively high elevation, in many areas it is best suited to short season crop varieties. Corn and alfalfa grow well under good management, which includes liberal applications of lime and fertilizer. Droughtiness is a problem, however, in most years. The hazard of erosion is slight where the slope gradient approaches the upper limit of the range for this map unit. Cross slope tillage and use of cover crops are practices that help to conserve soil and water. Although this soil is easy to till and good soil structure is easy to maintain, coarse fragments hinder some tillage operations.

Rare flooding is a severe limitation to the use of this soil for residential and commercial buildings. The downslope movement of subsurface water for very brief periods early in spring is a limitation to the use of this soil for dwellings with basements. The presence of coarse fragments is a limitation to some nonfarm uses. Capability subclass IIs.

Chippewa series

The Chippewa series consists of deep, nearly level, poorly drained soils that have a fragipan. These soils formed in glacial till derived from local siltstone, sandstone, and shale. They are in low areas on the upland plateau.

In a representative profile the surface layer is very dark gray silt loam 7 inches thick. The subsurface layer is mottled, dark gray and grayish brown silt loam 7 inches thick. The subsoil is a very firm fragipan of mottled, dark grayish brown channery loam 28 inches thick. The substratum, to a depth of 58 inches, is firm, dark grayish brown channery loam.

A water table is near the surface for long periods in spring and during periods of heavy rain. It is perched above the very slowly permeable fragipan. Most roots are confined to the moderately permeable, 10- to 15- inch thick zone above the dense fragipan. Available water capacity is low in this zone, but water from adjacent areas seeps nearly continuously across the top of the fragipan and keeps this zone moist. Nitrogen content is high, but nitrogen is slowly available to plants in spring when the soils are damp and cold. The natural supply of phosphorus is low, and the content of available potassium is medium to low. Natural content of lime is low.

These soils are used mostly for trees and, where cleared, for poor quality pasture. A few areas are artificially drained and are used for cultivated crops. Very slow permeability in the fragipan and prolonged seasonal wetness are limitations to many nonfarm uses of these soils.

Representative profile of Chippewa silt loam, in a pasture 50 feet east of Campbell Road and one mile south of Lebanon Center in the town of Lebanon:

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam; few fine distinct dark brown (7.5YR 4/4) mottles in lower part; moderate medium granular structure; friable; many fine roots; 1 percent coarse fragments; medium acid; abrupt smooth boundary.

A21g—7 to 11 inches; dark gray (10YR 4/1) silt loam; common medium distinct yellowish brown (10YR 5/4) and dark brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; friable; common fine roots; common fine pores; 1 percent coarse fragments; slightly acid; clear smooth boundary.

A22g—11 to 14 inches; grayish brown (2.5Y 5/2) silt loam; many fine and medium distinct light olive brown (2.5Y 5/6) and dark yellowish brown (10YR 4/4) mottles; weak thin and medium platy structure; firm in place, friable when removed; few fine roots; few fine pores; 2 percent coarse fragments; slightly acid; clear smooth boundary.

IIBxg—14 to 42 inches; dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2) channery loam; common medium distinct dark yellowish brown (10YR 4/4) and strong brown (7.5YR 5/6) mottles; moderate very coarse prismatic structure; gray (10YR 6/1) silt on exteriors of prisms; very firm and brittle; few fine pores; discontinuous clay linings in pores; 20 percent coarse fragments, the percentage increases with increasing depth; slightly acid; gradual wavy boundary.

IICg—42 to 58 inches; dark grayish brown (10YR 4/2) channery loam; common fine faint dark yellowish brown (10YR 4/4) mottles; weak thick platy structure; firm; 25 percent coarse fragments; weakly calcareous in lower part; neutral grading to mildly alkaline.

The solum is 40 to 55 inches thick. Carbonates are slightly below the solum or are absent within a depth of 60 inches. Depth to the top of the fragipan is 10 to 15 inches. Depth to bedrock is more than 5 feet. Coarse fragments are mainly flat and angular and make up 0 to 15 percent, by volume, of the upper part of the solum and as much as 40 percent of the lower part of the solum and the substratum. Local alluvium or colluvium mantles the upper part of the solum in many places. Reaction is strongly acid to neutral in the solum and slightly acid to moderately alkaline in the substratum.

In some areas there is an A1 horizon. The A1 or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The A2g horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. High chroma mottles are distinct or prominent. Structure is weak subangular blocky or platy. Consistence is friable or firm.

The Bxg horizon is loam and silt loam and channery or very channery analogues of these textures. The matrix color is similar to that of the A2g horizon, except chroma is slightly higher in places. Mottles are faint or distinct. Consistence is firm or very firm and is brittle.

The Cg horizon has color and texture similar to those of the Bg horizon, except the content of coarse fragments generally is somewhat higher.

Chippewa soils are in a drainage sequence with the somewhat poorly drained Volusia soils and the moderately well drained Mardin soils, which are in adjacent higher areas. Chippewa soils commonly are near very poorly drained Alden soils. They are similar to Alden soils but have a fragipan, which those soils lack.

Ch—Chippewa silt loam. This soil is nearly level and is in low depressions, drainageways, and seep spots. Slopes are slightly concave or plane. They range from 0 to 3 percent but are mostly less than 2 percent. This soil commonly receives a moderate to large amount of runoff from higher adjacent soils.

Included with this soil in mapping are a few small spots of somewhat poorly drained Volusia soils and small areas of soils that are similar to the very poorly drained Alden soils. A few areas of soils that do not have a distinct fragipan are also included.

In undrained areas, this soil is not suited to cultivated crops because of excessive wetness but it is suited to trees and to permanent pasture consisting of water-tolerant species. If drained, it is suited to cultivated crops commonly grown in the survey area. Adequate drainage is difficult to establish in some places because of a lack of suitable outlets. Interceptor drains to divert runoff from higher adjacent soils benefit many areas. Partial drainage to remove surface water in spring can improve permanent pasture in many areas.

Prolonged seasonal wetness and very slow permeability in the fragipan and substratum are limitations to the use of this soil for most nonfarm purposes. In some areas this soil has potential for development of wildlife habitat or as sites for ponds. Capability subclass IVw.

Collamer series

The Collamer series consists of deep, moderately well drained soils that formed in silty glaciolacustrine (lake-laid) deposits. These nearly level to hilly soils are on the lake plain and along some of the major valleys.

In a representative profile the surface layer is dark grayish brown silt loam 7 inches thick. The upper part of the subsoil is 9 inches thick and is friable, mottled, dark brown silt loam that has thin coatings of leached brown material. The lower part of the subsoil is firm, mottled, dark brown heavy silt loam 10 inches thick. The substratum, to a depth of 60 inches, is firm, mottled, dark brown to brown silt loam that has a few varves of fine sandy loam.

A temporary seasonal high water table is perched in the lower part of the subsoil early in spring and during long periods of rain. Permeability is moderate in the surface layer and upper part of the subsoil and is moderately slow in the lower part of the subsoil and substratum. Most roots are confined to the upper part of the subsoil; however, as the growing season progresses and the water table recedes, some roots extend to the substratum. Available water capacity is high. The natural supply of nitrogen is medium, the supply of phosphorus is low, and the content of available potassium is medium. The natural content of lime is medium to high.

Many areas of these soils are used for cultivated crops and hay and pasture. Some areas are used for trees or vegetables. Temporary seasonal wetness and moderately slow permeability are limitations to many nonfarm uses of these soils.

Representative profile of Collamer silt loam, 3 to 8 percent slopes, in a grassy field 70 feet west of Shorelawn Drive and 100 yards north of Shacketon Point Road in the town of Sullivan:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

B&A—7 to 16 inches; dark brown (10YR 4/3) silt loam; common fine distinct strong brown (7.5YR 5/6) mottles in the lower part; weak medium subangular blocky structure; friable; common fine roots; common fine pores; thin clay linings in some pores; brown (10YR 5/3) coatings, light gray (10YR 7/2) dry, that are more than 1 millimeter thick on faces of peds and are thicker at the top of the horizon; 1 percent coarse fragments; slightly acid; clear wavy boundary.

B2t—16 to 26 inches; dark brown (10YR 4/3) heavy silt loam; common fine distinct brown (7.5YR 5/4) and few fine faint brown (10YR 5/3) mottles; moderate medium and coarse subangular blocky structure; firm; few fine roots; common fine pores; thin brown (10YR 5/3) coatings, light gray (10YR 7/2) dry, on faces of peds in upper part; thick continuous clay linings in pores and thick patchy clay films on faces of peds in lower part; neutral; clear smooth boundary.

C—26 to 60 inches; dark brown to brown (7.5YR 4/2 to 4/4) silt loam that has a few varves of very fine sandy loam; many distinct olive (5Y 5/3) and light olive brown (2.5Y 5/4) mottles; weak medium platy structure; firm; few fine pores; few pinkish-gray (7.5YR 7/2) lime streaks along faces of plates; few gravel fragments in lower part; weakly calcareous; mildly alkaline.

The solum is 22 to 34 inches thick. Depth to carbonates ranges from 22 inches to slightly more than 34 inches. Depth to bedrock is more than 5 feet. Coarse fragments are few or absent in the solum and the upper part of the substratum. Reaction is medium acid to neutral in the upper part of the solum and slightly acid to neutral in the lower part of the solum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. Structure is weak or moderate granular. Some areas have an A1 horizon, and a thin A2 horizon is below the Ap or A1 horizon in some profiles.

The B&A horizon ranges from fine sandy loam to heavy silt loam. The B portion has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 or 4. The A portion has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 or 4. Consistence is friable or firm.

The B2t horizon ranges from silt loam to light silty clay loam. A thin subhorizon of very fine sandy loam is in a few profiles. Matrix color is similar to that of the B portion of the B&A horizon. High chroma mottles are few to many. Structure is medium or coarse subangular blocky or blocky.

The C horizon ranges from very fine sand to silt loam. Varving is common. Color is similar to that of the B2t horizon, except chroma is slightly lower in places. Structure is platy, or the material is massive. Consistence is firm or friable.

Collamer soils are in a drainage sequence with the somewhat poorly drained Niagara soils and the poorly drained and very poorly drained Canandaigua soils. They commonly are near the moderately well drained and well drained Schoharie soils, but they have a lower content of clay in the subsoil than Schoharie soils.

CkA—Collamer silt loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of series, except mottles are more distinct and are closer to the surface. Because runoff is

relatively slow, this soil is mainly in the wetter half of the moderately well drained class. Slopes are slightly convex.

Included with this soil in mapping are a few small areas of somewhat poorly drained Niagara soils in shallow depressions and along natural drainageways. Also included are poorly drained Canandaigua soils in a few deep depressions that are indicated on the soil maps by the symbol for a wet spot. Also included are a few areas of soils that are similar to this Collamer soil but have more than 5 percent gravel in the surface layer or in some other part of the profile.

This soil is suited to many cultivated crops, hay and pasture crops, and trees. In some areas it is well suited to vegetable and fruit crops. Wetness for brief periods in spring slightly delays tillage operations. Artificial drainage can be used to remove excess water from wet spots in many areas. This soil is quite easy to till at a favorable moisture content. If row crops or vegetable crops are grown intensively, the return of crop residue to the soil and use of cover crops are practices that help to maintain organic-matter content and promote good soil tilth.

Brief seasonal wetness, low bearing strength, and moderately slow permeability are limitations to the use of this soil for many nonfarm purposes. Cuts for underground utilities generally are unstable. Capability subclass IIw.

CkB—Collamer silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. Slopes are mostly simple and slightly convex, but some slopes are undulating. This soil receives some runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of somewhat poorly drained Niagara soils in shallow depressions and natural drainageways and poorly drained Canandaigua soils in deep depressions. Also included are a few small areas of Schoharie soils, which are similar to this Collamer soil but are finer textured. A few areas of soils that have more than 5 percent gravel fragments in the surface layer or subsoil are also included.

This soil is suited to cultivated crops, hay and pasture crops, and trees. It is suited to vegetable and fruit crops in some areas. Wetness slightly delays tillage operations for brief periods in spring. The hazard of erosion is moderate where the slope gradient approaches the upper limit of the range for this unit. The use of cover crops, return of crop residue to the soil, and minimum tillage are practices that help to control erosion and to maintain good soil tilth. Randomly placed drains for wet spots improve most fields. This soil is easy to till. Brief seasonal wetness, low bearing strength, moderately slow permeability, and slope are limitations to many nonfarm uses of this soil. Capability subclass IIe.

CkC—Collamer silt loam, rolling. This soil has a profile similar to the one described as representative of the series, except mottles are less distinct and are at a slightly greater depth. Slopes are mostly complex and are slightly convex. They range from 8 to 15 percent but are mostly less than 12 percent. This soil commonly receives some runoff from higher adjacent soils.

Included with this soil in mapping are a few large areas of soils that are similar to this Collamer soil but are well drained. A few small areas of finer textured Schoharie soils and sandy Arkport soils are also included. Small areas of soils that have more than 5 percent gravel in the surface layer or subsoil and a few of eroded soils are also included.

This soil is suited to some crops grown in the county. The hazard of erosion is severe in unprotected areas. The cropping system should include a high proportion of sod crops. Use of cover crops, return of crop residue to the soil, minimum tillage, and cross slope tillage where practical are important practices that help to maintain good soil tilth and to conserve soil and moisture. Brief seasonal wetness is a management concern. This soil is easy to till, but the complex slopes slightly hinder some machinery operations.

Slope, brief seasonal wetness, low bearing strength, and moderately slow permeability are limitations to many nonfarm uses of this soil. Steep cuts or excavations in toeslope areas of this soil can cause hazardous mass slumps or slides. Capability subclass IIIe.

CkD—Collamer silt loam, hilly. This soil has a profile similar to the one described as representative of the series, except the depth to the calcareous substratum is slightly less and distinct mottles are fewer. This soil is mostly in the drier half of the moderately well drained class. Slopes are mostly short and complex, but in a few areas they are simple. Slopes range from 15 to 25 percent. Some mapped areas are on cigar shaped landforms. This soil receives some runoff from higher adjacent soils.

Included with this soil in mapping are some fairly large areas of eroded soils and some small areas where there are scars from slips and slides. Also included are a few large areas of soils that are similar to this Collamer soil but are well drained and some small areas of soils that are steeper than this Collamer soil. A few small areas of finer textured Schoharie soils and coarser textured Arkport soils and a few areas of soils that have more than 5 percent gravel fragments in the surface layer or subsoil are also included.

This soil is best suited to hay and pasture and to trees. The hazard of erosion is very severe where there is no plant cover. If this soil is used for cultivated crops, the use of cover crops, minimum tillage, return of crop residue to the soil, and cross slope tillage are essential practices. Because of the complex slopes, contour farming and machinery operation are moderately difficult. Droughtiness is a slight problem in midsummer because of the loss of water through rapid runoff.

Slope is the principal limitation to nonfarm uses of this soil. This soil generally is unstable and produces slumps or slips where steep cuts or toeslope excavations are made. Special care is needed to protect scalped areas from erosion. Capability subclass IVe.

Colonie series

The Colonie series consists of deep, somewhat excessively drained soils. These soils formed mainly in eolian (windblown) deposits and also formed in glaciofluvial deltaic deposits that are dominantly fine sand. They are nearly level and undulating and are on benches and ridges on the lake plain.

In a representative profile the surface layer is brown loamy fine sand 7 inches thick. The subsoil is 47 inches thick. The upper part of the subsoil is very friable, strong brown loamy fine sand 12 inches thick; the middle part is very friable, brown fine sand 19 inches thick that has 3 thin, reddish brown horizontal bands of loamy fine sand; and the lower part is loose, brown fine sand 16 inches thick. The substratum, to a depth of 63 inches, is brown fine and medium sand.

The seasonal high water table is below the subsoil. Permeability is rapid in most of the soil profile, but the thin horizontal bands in the subsoil slightly impede the downward movement of water. These soils are an excellent medium for root development, but low available water capacity somewhat limits root growth. The natural content of nitrogen is medium to low. The natural supply of phosphorus is very low, and the supply of potassium is low. The natural content of lime is low.

Many areas of these soils are used for vegetables and root crops. Some areas are used for row crops, and a few areas are wooded or are idle. There are few limitations to the use of this soil for nonfarm purposes that require good drainage.

Representative profile of Colonie loamy fine sand, undulating, in an idle field 400 feet south of Fyler Road and 1/2 mile west of DeVaul Road in the town of Sullivan:

Ap—0 to 7 inches; brown (7.5YR 5/2) loamy fine sand; weak very fine granular structure; very friable; many fine and medium roots; medium acid; abrupt smooth boundary.

B21—7 to 19 inches; strong brown (7.5YR 5/6) loamy fine sand grading to fine sand; single grain; very friable; many fine and few medium roots; medium acid; gradual smooth boundary.

B22—19 to 38 inches; brown (7.5YR 5/4) fine sand; single grain; very friable; few fine roots; 3 wavy ripple lamellae, 1/2 inch thick, of reddish brown (5YR 4/3) loamy fine sand at a depth of 33, 36, and 38 inches; lamellae are massive and friable; medium acid; abrupt wavy boundary.

B3—38 to 54 inches; brown (7.5YR 5/4) fine sand; single grain; loose; slightly acid; gradual wavy boundary.

C—54 to 63 inches; brown (7.5YR 4/4) fine and medium sand; single grain; loose; salt and pepper appearance increases with depth; slightly acid.

The solum is 48 to 90 inches thick. Depth to carbonates is more than 72 inches. Depth to bedrock is 8 feet or more. Coarse fragments are few or absent. Reaction is strongly acid to slightly acid in the solum, and acidity decreases with increasing depth.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. Structure is weak or very weak granular.

The B horizon is mainly loamy fine sand or fine sand. In some places it is very fine sand. Hue is 10YR to 5YR, value is 4 to 6, and chroma is 2 to 4. Structure is very weak fine granular, or the material is single grain. Consistence is very friable or loose. Thin lamellae are in the B and C horizon in some places. Individual lamellae range from 1/16 inch to 2 inches in thickness. Total thickness of the lamellae bands is less than 6 inches. Some lamellae have more clay than the surrounding material. The lamellae have hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. They are mostly horizontally oriented, and their consistence is friable or firm.

The C horizon is dominantly fine sand, and thin strata or lenses of coarser textured or finer textured material are common. Color and consistence are similar to those of the B horizon. Mottles are in the C horizon in some profiles.

Colonie soils are in a drainage sequence with the moderately well drained Elnora soils, the somewhat poorly drained and poorly drained Naumburg soils, and the poorly drained Wareham soils. Colonie soils are similar to the well drained Arkport soils, but unlike those soils they have lamellae that are less than 6 inches in total thickness.

ClA—Colonie loamy fine sand, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, except a few mottles commonly are in the substratum. It is on terracelike and deltalike benches and on the top of low ridges. This soil generally does not receive runoff from adjacent soils.

Included with this soil in mapping are a few small areas of moderately well drained Elnora soils in slight depressions. Somewhat poorly drained to very poorly drained soils are also included and are indicated on the soil maps by the symbol for a wet spot. A few areas of soils that have thick strata of silt in the subsoil or substratum are also included.

This soil is suited to cultivated crops, hay and pasture, and trees. It is especially well suited to early season truck and garden crops, but in some areas irrigation is required to obtain optimum yields. This soil has excellent response to applications of fertilizer if moisture is available. Pasture generally is poor in quality because of droughtiness in midsummer. The hazard of soil blowing is moderate. Use of cover crops and planting of vegetative windbreaks help to control soil blowing. This soil is better suited than the undulating phase of Colonie soils to the use of land leveling and irrigation.

Sandy texture and excessive dryness are limitations to some nonfarm uses that require good drainage. Septic tank absorption fields generally function well in this soil. Capability subclass IIIs.

ClB—Colonie loamy fine sand, undulating. This soil has the profile described as representative of the series. Slopes are mostly undulating, but in a few areas they are smooth and simple. Slopes range from 3 to 8 percent. This soil does not receive runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of moderately well drained Elnora soils in slight depressions and somewhat poorly drained and poorly drained Naumburg soils in low depressions. Also included are a few small areas of Arkport soils and a sandy soil that is similar to this Colonie soil but has thick lenses or strata of silty or clayey material in the subsoil or substratum.

This soil is suited to some cultivated crops, hay and pasture, and trees. Early season truck and garden crops grow well on this soil, but irrigation is required in some places. Pasture generally is poor in quality because of droughtiness. In cultivated areas the hazards of erosion and soil blowing are moderate. Use of cover crops, return

of crop residue to the soil, cross slope tillage where practical, and planting of vegetative windbreaks are practices that reduce erosion and soil blowing. Compared to the nearly level phase of Colonie soils, irrigation and land leveling are more difficult, the hazard of erosion is greater, and traction in the loose sandy material is slightly poorer on this soil.

Slope, sandy texture, and excessive dryness are limitations to some nonfarm uses of this soil. This soil is suitable for use as homesites, but lawns generally turn brown rapidly in summer. Capability subclass IIIs.

Conesus series

The Conesus series consists of deep, moderately well drained soils. These soils formed in glacial till derived from fine grained sandstone, limestone, and shale. They are gently sloping and sloping and are on the upland plateau mostly at an elevation of less than 1,550 feet.

In a representative profile the surface layer is dark brown silt loam 8 inches thick. The subsurface layer is leached, faintly mottled, brown gravelly light silt loam 9 inches thick. The subsoil is 26 inches thick. The upper part of the subsoil is friable, mottled, brown gravelly silt loam 8 inches thick that has thin coatings of leached, brown light silt loam, and the lower part is firm, mottled, dark brown gravelly heavy silt loam 18 inches thick. The substratum, to a depth of 60 inches, is firm, grayish brown gravelly and channery silt loam.

A temporary seasonal high water table is in the subsoil early in spring and during other excessively wet periods. It commonly is perched above the slowly permeable substratum. The surface layer and subsoil are moderately permeable. Roots are mainly confined to the upper part of the subsoil; however, as the water table recedes late in spring, a few roots extend more deeply. Available water capacity is moderate to high. The natural content of nitrogen is medium. The natural supply of phosphorus is low, and content of potassium is medium. The natural content of lime is medium to low.

These soils are used for cultivated crops and hay and pasture. Some areas are reforested. Temporary seasonal wetness and slow permeability in the substratum are the main limitations to many nonfarm uses of these soils.

Representative profile of Conesus silt loam, 3 to 8 percent slopes, in a pasture 40 feet south of Hardscrabble Road and 1/2 mile east of its intersection with Judd Road in the town of Nelson:

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak medium and fine subangular blocky structure; friable; many fine and few medium roots; 10 percent coarse fragments; slightly acid; clear smooth boundary.

A&B—8 to 17 inches; brown (10YR 5/3) gravelly light silt loam; few fine faint yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; many fine roots; many fine pores; 30 percent dark brown (10YR 4/3) ped interiors; few patchy clay linings in pores in interior of peds; few thin vertical dark grayish brown (10YR 4/2) wormcasts; 15 percent coarse fragments; slightly acid; clear smooth boundary.

B&A—17 to 25 inches; dark brown (10YR 4/3) gravelly silt loam; common fine and medium faint yellowish brown (10YR 5/4) and few fine distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; common fine roots; many fine pores; clay linings in pores in interior of peds and patchy clay films on coarse fragments; brown (10YR 5/3) light silt loam coatings, light gray (10YR 7/2) dry, more than 1 millimeter thick on faces of peds; 20 percent coarse fragments; slightly acid; gradual wavy boundary.

B2t—25 to 43 inches; dark brown (10YR 4/3) gravelly heavy silt loam; common fine faint yellowish brown (10YR 5/4) and few fine distinct light olive brown (2.5YR 5/4) mottles; moderate coarse and medium subangular blocky structure; firm and slightly sticky; few fine roots in upper part; common fine pores; thick continuous clay linings in pores and patchy clay films on faces of peds; 30 percent coarse fragments; few dark shale fragments; neutral; gradual wavy boundary.

C—43 to 60 inches; grayish brown (2.5YR 5/2) gravelly and channery silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; massive; firm; 40 percent coarse fragments; weakly calcareous grading to strongly calcareous in lower part; mildly alkaline.

The solum is 35 to 45 inches thick. Depth to carbonates is about 35 to 45 inches. Depth to bedrock is more than 5 feet. Coarse fragments are of mixed lithology. Some profiles have a high proportion of dark shale fragments, which result in darker matrix colors. Coarse fragments make up 3 to 30 percent of the solum, and the percentage increases in the substratum. Reaction is strongly acid to neutral in the solum and mildly alkaline or moderately alkaline in the substratum.

The Ap horizon has hue mainly of 10YR, value of 3 or 4, chroma of 2 or 3.

The A&B and B&A horizons have a fine earth texture of loam or silt loam. The B portion of these horizons commonly is slightly finer textured than the A portion. The A portion has hue of 10YR or 2.5Y, value of 5 or 6 and chroma of 2 or 3. The B portion has hue of 10YR or 2.5YR, value of 4 or 5, and chroma of 3 or 4. Structure is weak or moderate subangular blocky. Consistence is friable or firm. High chroma mottles are faint or absent in the A&B horizon.

The Bt horizon is mainly loam or silt loam, and some subhorizons are light silty clay loam. Gravelly and channery analogues are common. Color is similar to that of the B portion of the B&A horizon. Mottles are common or many. Consistence is friable or firm.

The C horizon is silt loam or loam and includes gravelly, very gravelly, and channery analogues. It has hue of 10YR or 2.5YR, value of 4 or 5, and chroma mainly of 2. Structure is platy, or the material is massive. Consistence is firm or very firm.

Conesus soils are in a drainage sequence with well drained Lansing soils, somewhat poorly drained Appleton soils, and poorly drained and very poorly drained Lyons soils. Conesus soils formed in parent material similar to that in which those soils formed. They are in the same drainage class as Lima soils but are more acid and have a thicker solum than those soils.

CoB—Conesus silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. Slopes are slightly convex or plane. This soil commonly receives runoff from higher adjacent soils. A few mapped areas are undulating, and some areas are on foot slopes at the base of long slopes.

Included with this soil in mapping are small areas of somewhat poorly drained Appleton soils and poorly drained Lyons soils in drainageways and shallow depressions. The larger areas of these included soils are identified on the soil maps by symbols for drainageways and wet spots. A few small areas of Lansing soils on slightly elevated knolls are also included.

This soil is suited to cultivated crops, hay and pasture, and trees. It is used extensively for corn and alfalfa for forage. Erosion is a hazard, especially on long slopes. In

most areas conservation practices including minimum tillage, use of cover crops, and cross slope tillage help to control erosion. Randomly placed drains benefit many areas, particularly the included wet spots that excessively delay tillage in spring unless drained.

Temporary seasonal wetness and slow permeability in the substratum are limitations to many nonfarm uses. If this soil is used as a homesite, the site should be carefully selected and the drainage system should be properly designed to offset these limitations. Capability subclass IIe.

CoC—Conesus silt loam, 8 to 15 percent slopes. This soil has a profile similar to the one described as representative of the series, except the depth to the substratum is slightly less. Slopes are plane or slightly concave. This soil generally receives a moderate to large amount of runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of somewhat poorly drained Appleton soils along field drainageways. Also included are well drained Lansing soils in a few convex areas that are slightly higher on the landscape than this Conesus soil. Small seep spots at the base of long slopes are also included.

This soil is suited to cultivated crops but is better suited to hay and pasture crops and trees. In cultivated areas conservation practices are needed to reduce runoff and control erosion. The hazard of erosion is moderate to severe. Use of cover crops, return of crop residue to the soil, and minimum tillage are effective practices, and stripcropping and contour tillage can be used in many areas. Interceptor drains help to remove excess runoff and to reduce soil wetness early in the growing season.

Slope, temporary seasonal wetness, and slow permeability in the substratum are the main limitations to the use of this soil for nonfarm purposes. If this soil is used as a building site, the site should be selected carefully and interceptor drains and foundation drains should be installed. Capability subclass IIIe.

Edwards series

The Edwards series consists of very poorly drained, well decomposed organic soils that are underlain by marl at a depth of 16 to 51 inches. These nearly level soils are in low depressions on the lake plain and in a few small pockets in uplands.

In a representative profile the surface layer is black muck (sapric material) 8 inches thick. Below this, the material consists of a layer of well decomposed muck (sapric material) 27 inches thick. The upper part of this layer is black and friable, the middle part is dark reddish brown and firm, and the lower part is very dark grayish brown and friable. The substratum extends to a depth of 60 inches and is light gray, friable marl.

In undrained areas the water table is at or near the surface throughout the year. Ponding is common in spring. Permeability is rapid in the organic material but is variable in the underlying marl. In undrained areas roots are mainly confined to the surface layer. Available water capacity is high. The total content of nitrogen is high, but nitrogen is released slowly to plants in spring when the soils are wet and cold. The natural supply of phosphorus is very low, and content of potassium is low. The natural content of lime is low to high.

Many areas of these soils are drained and are used for vegetables and root crops. Undrained areas are mostly in the uplands and support water-tolerant trees and shrubs. Prolonged wetness, flooding, and instability are the main limitations to nonfarm uses of these soils.

Representative profile of Edwards muck, in a potato field 60 feet west of Fly Road and 1 mile north of Chestnut Ridge Road in the town of Sullivan:

Oap—0 to 8 inches; black (N 2/0) broken face and rubbed sapric material (muck), dark reddish brown (5YR 2/2) dry; about 2 percent fibers, no fibers when rubbed; moderate fine granular structure; friable; few fine roots; recognizable fibers are herbaceous; about 25 percent silt; few clean sand grains; medium acid; clear smooth boundary.

Oa2—8 to 16 inches; black (N 2/0) broken face and rubbed sapric material (muck); about 2 percent fibers, no fibers when rubbed; weak coarse subangular blocky structure; friable; very few roots in upper part; many fine pores; recognizable fibers are herbaceous; about 20 percent silt; 1 percent woody fragments; medium acid; clear smooth boundary.

Oa3—16 to 32 inches; dark reddish brown (5YR 2/2) rubbed sapric material (muck); about 20 percent fibers, no fibers when rubbed; massive; firm; few large pores; fibers are mainly sedge remains; about 10 percent silt; 10 percent woody fragments; slightly acid; clear smooth boundary.

Oa4—32 to 35 inches; very dark grayish brown (10YR 3/2) broken face and rubbed sapric material (muck); about 5 percent fibers, no fibers when rubbed; weak medium platy structure; friable; common fine pores; fibers are mainly herbaceous; about 30 percent silt; few quartz grains; 5 percent woody fragments; mildly alkaline; clear smooth boundary.

IILca—35 to 60 inches; light gray (10YR 7/2) marl; common fine faint very pale brown (10YR 7/4) mottles; massive; friable; common fine and medium pores; common quartz grains in lower part; common small aquatic shells; strong effervescence.

Depth to calcareous marly material ranges from 16 to 51 inches. Depth to bedrock is more than 8 feet. Woody fragments make up 0 to 20 percent, by volume, of the organic material. A few profiles have large logs in some layers. Reaction in the organic material ranges from medium acid to mildy alkaline. Fibers are mainly herbaceous, but some fibers are woody. Some profiles have hemic and fibric layers, but combined thickness of these layers is less than 5 inches.

The surface layer has hue of 10YR, or the color is neutral. It has value of 2 and chroma of 1 or 0. Rubbed fiber content generally is less than 5 percent, and rubbed fibers commonly are absent. Structure is weak or moderate granular.

The subsurface layers and the bottom layers, where present, have hue of 10YR, 7.5YR, or 5YR, or the color is neutral; they have value of 2 or 3 and chroma of 0 to 2. Rubbed fiber content is less than 10 percent. The material is mainly massive, but structure in some profiles is subangular blocky or platy. Consistence is mostly friable or very friable, but in some sublayers it is firm.

The IILca horizon has hue of 10YR, value of 5 to 7, and chroma mainly of 2. Sandy lenses or quartz grains commonly are in the marl in many profiles. Effervescence is strong or violent.

Edwards soils commonly are near Martisco soils. They are similar to those soils but have thicker organic deposits. Edwards soils formed in organic deposits similar to those in which Palms and Willette soils formed. They are underlain by marl, unlike Palms and Willette soils which are underlain by loamy and clayey material, respectively.

Ed—Edwards muck. This soil is nearly level. It formed in well decomposed organic deposits that overlie marl. It is in low depressions. Slopes are mostly 1 percent or less.

Included with this soil in mapping are small areas of Martisco soils, which have thinner organic deposits than this Edwards soil. A few small spots of soils that are mostly adjacent to streams and have a thin mantle of silty alluvium and a few small areas of Willette muck are also included.

If undrained, this soil is best suited to permanent native vegetation. If drained, it is well suited to vegetables and root crops. Careful consideration should be given to the practicability of drainage. In drained areas where the organic deposits are less than 36 inches thick, the productive life of the soil is relatively short because of subsidence and oxidation of the organic material. If drainage outlets are established, tile drains can be used even if they are placed in the marl substratum. Soil blowing is a hazard in drained areas and should be controlled by manmade or vegetatve windbreaks and by the use of cover crops. Regulation of the water table helps to reduce oxidation losses. Compaction by heavy equipment can reduce permeability and thus adversely affect the performance of drainage systems.

The prolonged high water table, hazard of flooding, and instability are severe limitations to most nonfarm uses of this soil. Areas that have thick deposits of marl have potential as a source of lime for agricultural use. Capability subclass IVw.

Elmwood series

The Elmwood series consists of deep, moderately well drained soils. These soils formed in glaciofluvial deposits that are mainly fine sand and that overlie glaciolacustrine clay and silt at a depth of 20 to 40 inches. They are nearly level or gently sloping and are on the lake plain.

In a representative profile the surface layer is dark brown fine sandy loam 9 inches thick. The subsoil is 23 inches thick. The upper 17 inches is very friable, mottled, strong brown and brown fine sandy loam, and the lower 6 inches is mottled, light reddish brown loamy fine sand. The substratum extends to a depth of 60 inches and is mainly firm, reddish brown silty clay with strata of very fine sand and silt.

A temporary seasonal high water table is perched above the fine textured substratum early in spring and during long rainy periods. Permeability is moderately rapid in the sandy surface layer and subsoil and very slow in the clayey substratum. Roots are mostly confined to the upper part of the subsoil, but some roots extend more deeply as the water table recedes late in spring. Available water capacity is moderate to high. The natural supply of nitrogen is medium. The natural content of phosphorus is low, and the supply of potassium is low to medium. The natural content of lime is medium to low.

These soils are used for vegetables, row crops, and hay and pasture. Some areas are idle or are used for trees. Temporary seasonal wetness and very slow permeability in the substratum are limitations to some nonfarm uses of these soils.

Representative profile of Elmwood fine sandy loam, 0 to 3 percent slopes, in a brushy field 40 feet north of Lake Street and 0.3 mile east of State Route 46 in the city of Oneida:

Ap—0 to 9 inches; dark brown (7.5YR 3/2) fine sandy loam; weak fine granular structure; very friable; many fine roots; neutral; abrupt smooth boundary.

B21—9 to 18 inches; strong brown (7.5YR 5/6) fine sandy loam; few fine faint yellowish red (5YR 5/6) mottles in lower part; very weak fine subangular blocky structure; very friable; common fine roots; many fine pores; few darker iron concretions; slightly acid; clear smooth boundary.

B22—18 to 26 inches; brown (7.5YR 5/4) fine sandy loam; few fine distinct yellowish brown (10YR 5/8) and few fine faint brown (7.5YR 5/2) mottles; weak fine and medium subangular blocky structure; very friable and a few firmer lumps; few fine roots; common fine pores; slightly acid; clear smooth boundary.

B3—26 to 32 inches; light reddish brown (5YR 6/3) loamy fine sand; common medium distinct strong brown (7.5YR 5/6) mottles; weak thin platy structure; friable; common fine pores; few darker iron concretions; slightly acid; abrupt smooth boundary.

IIC1—32 to 34 inches; reddish brown (5YR 5/3) sandy clay loam; few medium faint weak red (2.5YR 5/2) and brown (7.5YR 5/4) mottles; massive; friable and slightly sticky; slightly acid; abrupt smooth boundary.

IIC2—34 to 60 inches; reddish brown (5YR 4/4) silty clay that has strata of very fine sand and silt in lower part; common fine distinct strong brown (7.5YR 5/6) and threadlike grayish brown (10YR 5/2) mottles; moderate thick platy structure; firm, sticky and plastic; few fine pores; neutral.

The moderately coarse textured mantle is 20 to 40 inches deep to fine textured or moderately fine textured material. Bedrock is at a depth of more than 5 feet. Coarse fragments generally are absent throughout the soil profile. Reaction is strongly acid to slightly acid in the solum and slightly acid or neutral in the substratum. Carbonates are in the lower part of the profile in some areas.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. Consistence is friable or very friable.

The B horizon is mainly fine sandy loam or sandy loam, and subhorizons in some places are loamy fine sand. Hue is 10YR to 5YR, value is 4 to 6, and chroma is 3 to 6. High chroma mottles are in the middle and lower part of this horizon. Structure is weak or very weak or is absent. Consistence ranges from loose to friable.

The C horizon is mainly heavy silty clay loam, clay loam, or silty clay. Some profiles do not have a IIC1 horizon. The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. Mottles of higher and lower chroma are present. Structure is platy or absent. Depositional strata of sand and silt are in the lower part of the substratum in many profiles.

Elmwood soils form a drainage sequence with the poorly drained and somewhat poorly drained Swanton soils. They commonly are near the sandy Galen soils. They have drainage similar to that of Galen soils but have a fine textured substratum, which those soils do not have.

ElA—Elmwood fine sandy loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. Slopes are slightly convex. This soil receives little or no runoff from adjacent soils.

Included with this soil in mapping are small areas of somewhat poorly drained and poorly drained Swanton soils in shallow depressions and in flats. Also included are a few small areas of soils that have gravel in the moderately coarse textured, sandy mantle. A few areas of

soils that are similar to Galen soils but have fine textured deposits at a depth of more than 40 inches are also included.

This soil is suited to cultivated crops, hay and pasture, and trees. Many areas are well suited to vegetables. This soil is easy to till, but in some years tillage is slightly delayed because of brief seasonal wetness early in spring. Installing drainage for wet spots benefits many areas. This soil can be intensively cultivated if management practices include minimum tillage, returning crop residue to the soil, and use of cover crops.

Brief seasonal wetness and very slow permeability in the substratum are the main limitations to most nonfarm uses. Sidewalls of excavations for underground utilities commonly are unstable. Capability subclass IIw.

ElB—Elmwood fine sandy loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, except mottles are fewer and are at a greater depth. This soil is mostly in the upper half of the moderately well drained class. Slopes are slightly convex. This soil receives some runoff from adjacent soils. Some mapped areas are undulating.

Included with this soil in mapping are a few small areas of nearly level Elmwood soils. Also included are a few areas of soils that have gravel in the surface layer and subsoil. Soils that are similar to Galen soils but are more than 40 inches deep to a fine textured substratum are also included.

This soil is suited to most of the crops grown in the county, including many vegetable crops. Because this soil is free of coarse fragments and is friable, it is easy to till if excess water is removed. The hazard of erosion is moderate in unprotected areas. Use of cover crops, return of crop residue to the soil, minimum tillage, and including sod crops in the cropping system are practices that reduce erosion and soil blowing. In some years wetness briefly delays tillage operations early in spring. Brief seasonal wetness, very slow permeability in the substratum, and slope are limitations to many nonfarm uses. Care should be taken during the installation of underground utilities because of sidewall instability. Capability subclass IIe.

Elnora series

The Elnora series consists of deep, moderately well drained soils. These soils formed in glaciofluvial (water-laid) and eolian (windblown) deposits that are mainly fine sand. They are nearly level and are on slightly raised benches on the lake plain.

In a representative profile the surface layer is very dark grayish brown loamy fine sand 8 inches thick. The subsoil is very friable and is 17 inches thick. It is strong brown loamy fine sand and brown fine sand that is mottled in the lower part. The substratum extends to a depth of 60 inches. It is very friable, dark brown fine sand in the upper part and loose, brown fine sand in the lower part.

A temporary seasonal high water table is in the subsoil early in spring and in other excessively wet periods. The depth to the water table commonly corresponds to the natural level of ground water, but at times the water table is perched above slowly permeable layers deep in the substratum. Permeability is moderately rapid or rapid in the subsoil and rapid in the substratum to a depth of 4 feet or more. Roots are mostly confined to the upper 24 inches of soil, but a few roots extend more deeply as the water table recedes in spring. Available water capacity is low to very low. The natural content of nitrogen is medium to low. The supply of natural phosphorus is very low, and content of potassium is low. The natural content of lime is low.

Some areas of these soils are used for cultivated crops and vegetables. Many areas are used for pasture or trees or are idle. Temporary seasonal wetness is the main limitation to nonfarm uses of these soils.

Representative profile of Elnora loamy fine sand, in an idle field 70 feet east of DeVaul Road and 0.7 mile south of Chestnut Ridge Road in the town of Sullivan:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loamy fine sand, dark grayish brown (10YR 4/2) rubbed; weak fine granular structure; very friable; common medium and few fine roots; medium acid; abrupt smooth boundary.

B21—8 to 13 inches; strong brown (7.5YR 5/6) loamy fine sand; very weak fine and medium subangular blocky structure; very friable; common fine roots; medium acid; clear smooth boundary.

B22—13 to 19 inches; brown (7.5YR 5/4) fine sand; single grain; very friable; few fine roots; medium acid; gradual wavy boundary.

B23—19 to 25 inches; brown (10YR 5/3) fine sand; few fine and medium faint yellowish brown (10YR 5/6) mottles; single grain; very friable; medium acid; gradual wavy boundary.

C1—25 to 32 inches; dark brown (10YR 4/3) fine sand; common medium and fine distinct strong brown (7.5YR 5/6) mottles; single grain; very friable; slightly acid; gradual wavy boundary.

C2—32 to 60 inches; brown (10YR 5/3) fine sand; many fine and medium distinct strong brown (7.5YR 5/8) mottles and few medium distinct rounded dark brown (7.5YR 4/2) mottles that are slightly more coherent than the matrix; single grain; loose; slightly acid.

The solum varies in thickness but is as much as 36 inches thick. Depth to carbonates and bedrock is more than 5 feet. Coarse fragments are very few or are absent. Reaction is very strongly acid to slightly acid in the solum and strongly acid to neutral in the substratum.

Some areas have an A1 horizon. The Ap or A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. In some undisturbed areas a thin horizon that is similar to a spodic horizon underlies the A1 horizon.

The B horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 to 6. Texture is mainly loamy fine sand or fine sand, and subhorizons of very fine sand or medium sand are in some profiles. Structure is very weak granular or subangular blocky structure, or the material is single grain. Consistence is very friable or loose. Distinct mottles are within 36 inches of the surface. Some of the redder mottles are firm and lumpy. Thin, slightly firmer lamellae that have redder hue but no increase in clay are within 48 inches of the surface in some profiles.

The C horizon has color and texture similar to those of the B horizon. Silty lenses are below a depth of 40 inches in some places.

Elnora soils are in a drainage sequence with the somewhat excessively drained Colonie soils, the somewhat poorly drained and poorly drained Naumburg soils, and the poorly drained Wareham soils. They are similar to the moderately well drained Galen soils but have less very fine sand and clay in the subsoil than those soils.

En—Elnora loamy fine sand. This nearly level soil formed in wind and water-laid deposits of fine sand. It receives little or no runoff from higher adjacent soils.

Included with this soil in mapping are a few small depressional areas of somewhat poorly drained and poorly drained Naumburg soils and poorly drained Wareham soils. The more prominent areas of these included soils are indicated on the soil maps by the symbol for a wet spot. Somewhat excessively drained Colonie soils on a few knolls and rises are also included.

This soil is suited to cultivated crops and trees. Wetness early in spring, droughtiness, and soil blowing are important management concerns. Pasture generally is poor in quality because of droughtiness in midsummer. In some places truck and garden crops require irrigation to obtain optimum yields. If moisture is available, this soil has excellent response to heavy applications of fertilizer. Although this soil is easy to till, many mapped areas are small and commonly have inclusions of wetter soils. Use of cover crops and planting of vegetative windbreaks help to prevent soil blowing.

Temporary seasonal wetness, coarse texture, and droughtiness in summer are limitations to the use of this soil for some nonfarm purposes. Ditchbanks are unstable during the installation of underground utilities. Capability subclass IIw.

Farmington series

The Farmington series consists of shallow, well drained soils. These soils formed in a thin mantle of glacial till that commonly is mixed with frost-fractured material derived from the underlying bedrock. They are gently sloping to very steep. They are on the northern fringe of the upland plateau and are mostly at an elevation of less than 1,100 feet.

In a representative profile the surface layer is very dark grayish brown cherty silt loam 7 inches thick. The subsoil is cherty silt loam 10 inches thick. The upper part is brown and very friable, and the lower part is dark brown and friable. Jointed, hard limestone is at a depth of 17 inches.

These soils generally do not have a water table. Permeability is moderate. Roots are restricted to the 10- to 20-inch thick zone above the bedrock. Root development is good in this zone, but available water capacity is low or very low. These soils dry and warm rapidly in spring. The natural content of nitrogen is medium, supply of phosphorus is low, and supply of available potassium is medium. The natural content of lime is medium to high. A few areas of these soils are used for cultivated crops and hay. Most areas are used for pasture or trees or are idle. Shallow depth to bedrock is the main limitaiton to nonfarm uses of these soils.

Representative profile of Farmington cherty silt loam, 3 to 8 percent slopes, in a field of scrub brush 30 feet east of County Route 25 and 3/4 mile south of Clockville in the town of Smithfield:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) cherty silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; very friable; many medium and fine roots; 20 percent coarse fragments; slightly acid; abrupt smooth boundary.

B21—7 to 10 inches; brown (7.5YR 5/4) cherty silt loam; weak fine subangular blocky structure; very friable; many fine and few medium roots; many fine pores; common darker earthworm channels and old root channels; 20 percent coarse fragments; neutral; gradual wavy boundary.

B22—10 to 17 inches; dark brown (7.5YR 4/4j) cherty silt loam; weak medium and fine subangular blocky structure; friable; common fine and medium roots; many fine pores; few darker organic root stains and earthworm channels; few clay patches in pores; 25 percent coarse fragments increasing with depth; neutral; abrupt irregular boundary.

R—17 inches; hard limestone; common vertical joints filled with dark brown (10YR 4/3) silt loam.

The thickness of the solum and depth to bedrock are 10 to 20 inches. Coarse fragments are mainly chert and make up 10 to 35 percent, by volume, of the solum. Reaction ranges from strongly acid to neutral in the solum, and acidity decreases with increasing depth.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2. Consistence is friable or very friable.

The B horizon is silt loam or loam, and cherty and gravelly analogues of these textures are common. The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. Structure is fine or medium subangular blocky, and consistence is friable or very friable. A few mottles are above the bedrock in some profiles.

The bedrock is mostly gray or dark gray jointed limestone. Soil material commonly extends into the joints. In a few small areas the bedrock is hard, alkaline shale.

Farmington soils are near Wassaic soils. They are similar to Wassaic soils, except they are shallower to bedrock. They are also similar to shallow Arnot soils, except they are less acid.

FaB—Farmington cherty silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It is on broad benches above escarpments and on hilltops and valley sides where bedrock is close to the surface. Slopes commonly have a stairstep appearance because the underlying bedrock is ledged.

Included with this soil in mapping are bedrock outcrops that make up as much as 5 percent of individual areas. Also included are small areas of moderately deep Wassaic soils and a few areas of soils that are less than 10 inches deep to bedrock. A few areas of soils that have slopes of 8 to 12 percent are also included.

This soil is better suited to hay and pasture crops and trees than to cultivated crops. If cultivated crops are grown, early short season varieties grow best because of the low or very low available water capacity. The hazard of erosion is slight in cultivated areas. The shallow depth to bedrock and the presence of rock outcrops in places hinder some tillage operations.

Shallow depth to hard bedrock limits the use of this soil for nonfarm purposes. Because of fissures and solution channels in the bedrock, septic effluent and other waste can pollute the underlying ground water. In many areas this soil has potential for recreational uses, for example, hiking and picnicking, especially in areas that have a scenic view overlooking Oneida Lake. Capability subclass IIIs.

FGC—Farmington-Wassaic-Rock outcrop complex, sloping. This map unit consists of about 50 percent Farmington cherty silt loam, 20 percent Wassaic silt loam, and 20 percent Rock outcrop. The soils and Rock outcrop form such an intricate pattern on the landscape that it was not practical to map them separately at the scale used. The Farmington and Wassaic soils have a profile similar to the one described as representative of their series, except the surface layer and subsoil are thinner. This map unit is on glacier-scoured benches above escarpments and valley sides. Because of the ledged bedrock, the landscape commonly has a stairstep appearance. Slopes range from 5 to 15 percent.

Included with this unit in mapping are some large areas of a soil that is less than 10 inches deep to bedrock. Also included are a few areas of soils that have slopes of 0 to 5 percent and a few small areas of soils that have slopes of 15 to 25 percent. A few areas of soils that are more than 40 inches deep to bedrock are also included.

The soils in this map unit are not suited to cultivated crops or hay because of the variable soil depth and the large number of rock outcrops. Pasture is poor in quality because of droughtiness in summer. In most areas the soils are better suited to trees or wildlife habitat than to pasture. The hazard of erosion is variable; it is severe in the more sloping areas if the vegetation is removed.

The shallow depth to bedrock and the presence of rock outcrops are the main limitations to nonfarm uses of the soils in this map unit. In areas that have a scenic view, the soils have potential for recreational uses, for example, hiking, nature trails, and picnicking. Capability subclass VIs.

FHF—Farmington-Rock outcrop complex, steep. This map unit consists of about 50 percent Farmington cherty silt loam and 40 percent Rock outcrop. The soil and Rock outcrop form such an intricate pattern on the landscape that it was impractical to map them separately at the scale used. The Farmington soil has a profile similar to the one described as representative of the series, except it is shallower to bedrock and has a higher content of coarse fragments in the surface layer. This map unit is along escarpment faces, on sides of major valleys, and in gorges that were cut into the shale or limestone bedrock by dissecting streams. Slopes range from 45 to 80 percent.

Included with this complex in mapping are some large areas of a soil that is less than 10 inches deep to bedrock and a few areas of soils that have slopes of less than 45 percent.

Because of steep slopes and shallow depth to bedrock, the soil in this unit is unsuitable for farming. In many areas the soil is deep enough to support drought-tolerant trees. Where vegetation is removed or timber is clearcut, the hazard of erosion is severe.

This map unit is unsuited to most nonfarm uses because of slope, presence of Rock outcrop, and shallow depth to bedrock. Some areas have scenic value, but the potential for recreational uses is variable. A few areas have sites of geologic interest. Capability subclass VIIs.

Fonda series

The Fonda series consists of deep, very poorly drained soils. These soils formed in glaciolacustrine (lake-laid) deposits that are mainly clay and silt. They are nearly level and are in depressions on the lake plain.

In a representative profile the surface layer is black mucky heavy silt loam 7 inches thick. The subsoil is firm and mottled and is 24 inches thick. The upper 4 inches is gray silty clay loam; the middle 13 inches is very sticky and very plastic, reddish gray silty clay; and the lower 7 inches is very sticky and very plastic, brown silty clay. The substratum, to a depth of 60 inches, is firm, mottled, reddish gray silty clay.

The water table is at or near the surface for long periods during the year. Runoff is very slow and is ponded in many areas in spring. Permeability is moderate in the surface layer and slow or very slow below that. Most roots in undrained areas are confined to the surface layer by the water table. Roots extend more deeply in drained areas, but the fine textured subsoil is a poor medium for root development. Available water capacity is moderate to high. The natural content of nitrogen is high, but nitrogen is slowly available to plants in spring when the soils are wet and cold. The natural content of phosphorus is low to medium and the content of available potassium is high. The natural content of lime is high.

Undrained areas of these soils are idle or are used for water-tolerant tree species or poor quality pasture. Drained areas are used for some cultivated crops. Prolonged wetness and slow or very slow permeability are limitations to nonfarm uses of these soils.

Representative profile of Fonda mucky silt loam, in an abandoned field 120 yards south of Pine Ridge Road and 0.2 mile west of North Main Street in the town of Lenox:

Ap—0 to 7 inches; black (10YR 2/1) mucky heavy silt loam, gray (10YR 5/1) dry; moderate medium granular structure; very friable; many fine and few medium roots; slightly acid; abrupt smooth boundary.

B21g—7 to 11 inches; gray (10YR 5/1) silty clay loam; few medium faint brown (10YR 5/3) mottles; weak coarse prismatic structure parting to weak medium and coarse subangular blocky; firm, sticky, and plastic; common fine roots; few fine and medium pores; thin patchy clay films lining pores; neutral; gradual wavy boundary.

B22g—11 to 24 inches; reddish gray (5YR 5/2) silty clay; many medium distinct brown (7.5YR 5/4) and few fine distinct strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to weak coarse blocky; firm, very sticky, and very plastic; few fine and medium pores; primary faces of peds are gray (5YR 5/1); thin patchy clay films lining pores and on faces of peds; neutral; gradual wavy boundary.

B3g—24 to 31 inches; brown (7.5YR 5/2) silty clay; many medium distinct dark brown (7.5YR 4/4) and reddish brown (5YR 5/4) mottles and common fine distinct greenish gray (5GY 6/1) threadlike mottles; weak coarse blocky structure grading to weak thick platy structure in the lower part; firm, very sticky, and very plastic; few fine and medium pores; gray (10YR 5/1) faces of peds; few thick patchy clay films on faces of peds and thin patchy clay films lining pores; mildly alkaline; gradual wavy boundary.

Cg—31 to 60 inches; reddish gray (5YR 5/2) silty clay; many medium distinct mixed yellowish red (5YR 5/8), brown (7.5YR 4/4), and strong brown (7.5YR 5/6) mottles and few fine distinct greenish gray (5GY 6/1) mottles; moderate thick platy structure; firm, very

sticky, and very plastic; thin gray (5Y 6/1) silt varves in lower part; few pinkish gray (5YR 6/2) lime coats; strongly calcareous; moderately alkaline.

The thickness of the solum and the depth to carbonates are 24 to 36 inches. Depth to bedrock is more than 5 feet. Coarse fragments are absent or are very few in number throughout the profile. Reaction is slightly acid or neutral in the surface layer and neutral or mildly alkaline in the rest of the solum.

Some areas have an A1 horizon. The Ap or A1 horizon has hue mainly of 10YR, value of 2, and chroma of 1 or 2. Structure is moderate or strong granular. Some undisturbed areas have a thin O2 horizon.

The Bg horizon is silty clay loam, clay, or silty clay. It has hue of 2.5Y to 5YR, value of 4 or 5, and chroma mainly of 1 or 2. The B21g horizon has chroma of 1 or less, and in some areas it does not have high chroma mottles. The other Bg horizons have high chroma mottles. Consistence is plastic or very plastic and sticky or very sticky.

The Cg horizon has texture similar to that of the Bg horizon and commonly is varved with silt. Color is similar to that of the Bg horizon.

Fonda soils are in a drainage sequence with the moderately well drained and well drained Schoharie soils, the somewhat poorly drained Odessa soils, and the poorly drained and very poorly drained Lakemont soils. Fonda soils formed in parent material similar to that in which those soils formed. They are similar to and commonly are near Canandaigua soils but are finer textured than those soils.

Fo—Fonda mucky silt loam. This soil is nearly level and formed in glacial lake deposits and in a few slack water deposits on flood plains. It is in low, basinlike areas. Slopes range from 0 to 3 percent but are mostly less than 1 percent. This soil receives a moderate to large amount of runoff and subsurface seepage from higher adjacent soils.

Included with this soil in mapping are a few small areas of poorly drained and very poorly drained Lakemont and Canandaigua soils. A few areas of soils that have a thin surface layer of muck 8 to 12 inches thick are also included.

In undrained areas this soil is suited to a few species of water-tolerant pasture grasses and trees. In drained areas it is suited to some cultivated crops. Drainage commonly is difficult to establish because of slow or very slow permeability and a lack of suitable outlets. Closely spaced, open drains generally function better than tile drains. Bedding improves surface drainage in many areas. The high organic-matter content in the surface layer helps to supply nutrients and to promote good soil tilth. If the organic material is removed or oxidized, good soil tilth is more difficult to maintain and clods form in the soil.

Prolonged wetness and slow or very slow permeability are severe limitations to the use of this soil for nonfarm purposes. Some areas have good potential as sites for wildlife marshes. Capability subclass IVw.

Fredon series

The Fredon series consists of deep, somewhat poorly drained and poorly drained soils. These soils formed in glaciofluvial (water-laid) sand and gravel deposits derived from limestone, sandstone, and shale. They are nearly level and are on low valley terraces and outwash plains.

In a representative profile the surface layer is very dark grayish brown silt loam 11 inches thick. The subsoil is friable, mottled, grayish brown gravelly silt loam and gravelly loam 17 inches thick. The substratum, to a depth of 60 inches, is very friable, dark grayish brown very gravelly loamy sand.

A seasonal high water table is in the upper part of the subsoil in spring and in other excessively wet periods. Permeability is moderate or moderately slow in the subsoil and moderately rapid or rapid in the substratum. Most roots are confined to the upper part of the subsoil, but some roots extend more deeply as the water table lowers during the summer. Available water capacity is moderate to high. The natural content of nitrogen is medium to high, but nitrogen is released slowly to plants in spring when the soils are damp and cold. The natural supply of phosphorus is low, and content of available potassium is medium. Content of lime is medium.

Most areas of these soils are in pasture and hay crops and trees. In cultivated areas these soils are used only for late planted crops unless they are artificially drained. Seasonal wetness is the main limitation to many nonfarm uses of these soils.

Representative profile of Fredon silt loam, in a hayfield 100 yards north of Holmes Road and 0.2 mile east of Judd Road in the town of Cazenovia:

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; many fine and few medium roots; 10 percent coarse fragments; neutral; abrupt smooth boundary.

B21g—11 to 16 inches; grayish brown (10YR 5/2) gravelly silt loam; many (45 percent) coarse faint brown (10YR 5/3) and few medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine and few medium roots; many fine pores; 20 percent coarse fragments; neutral; gradual wavy boundary.

B22g—16 to 28 inches; grayish brown (10YR 5/2) gravelly loam; common medium distinct yellowish brown (10YR 5/4) and few strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; many fine pores; patchy clay films lining pores and on faces of a few peds; 30 percent coarse fragments; neutral; clear smooth boundary.

IIC—28 to 60 inches; dark grayish brown (10YR 4/2) very gravelly loamy sand; common fine distinct strong brown (7.5YR 5/6) mottles; single grain; very friable; 60 percent coarse fragments; neutral.

The solum is 23 to 34 inches thick. Depth to carbonates is more than 30 inches. Depth to bedrock is more than 6 feet. Coarse fragments are mainly gravel and cobbles of mixed lithology. They make up 5 to 20 percent, by volume, of the upper part of the solum, 20 to 35 percent of the lower part of the solum, and as much as 65 percent of the substratum. Reaction is medium acid to neutral in the solum and in the upper part of the substratum.

The Ap horizon has hue of 10YR or 2.5YR, value of 3 or 4, and chroma of 2. Some profiles have an A1 horizon that is slightly darker in color. Some profiles have a thin A2g horizon.

The B2g horizon is fine sandy loam, loam, or silt loam, and gravelly analogues are common. Hue is 10YR or 2.5YR, value is mainly 4 or 5, and chroma is 2. More than 40 percent of the soil material in some subhorizons has chroma of 3 or higher. Mottles are few to many and have hue as red as 5YR. Structure is weak or moderate subangular blocky or platy. Consistence is very friable to firm.

The IIC horizon is very gravelly loamy sand or stratified sand and gravel. In some places sandy loam is in the upper few inches. Hue is 10YR or 2.5YR, value is 4 or 5, and chroma is 2 or 3. Consistence is very friable or loose.

Fredon soils are in a drainage sequence with well drained and somewhat excessively drained Howard soils, moderately well drained Phelps soils, and very poorly drained Halsey soils. They commonly are near sandy Minoa soils on the lake plain. They are similar to Minoa soils but have more coarse fragments.

Fr—Fredon silt loam. This soil is nearly level and formed in glacial outwash deposits. It is on low benches, terraces, and plains. These landforms are along valley floors and in islandlike areas on the lake plain. This soil is mainly somewhat poorly drained, but in some areas it is poorly drained. Slopes range from 0 to 3 percent but are mostly less than 2 percent. This soil commonly receives runoff and subsurface seepage from higher adjacent soils.

Included with this soil in mapping are a few small areas of soils that have a thin mantle of alluvium and a few areas of soils that have a surface layer of gravelly silt loam. A few areas of very poorly drained Halsey soils in small, deep depressions are also included.

If undrained, this soil is suited to hay and pasture crops, trees, and some cultivated crops, but the choice of cultivated crops is limited. If adequately drained, it is suited to most row crops grown in the county. Drainage is difficult to establish in some places because of the low position of this soil on the landscape. If suitable outlets are available, however, tile drains function well. Gravel and cobbles obstruct the roots of some crops and hinder some tillage operations.

Seasonal wetness is the main limitation to the use of this soil for nonfarm purposes. Some areas have good potential for development of wetland wildlife habitat. Capability subclass IIIw.

Galen series

The Galen series consists of deep, moderately well drained soils. These soils formed in glaciofluvial and glaciolacustrine deposits that are mainly fine sand and very fine sand. They are nearly level and gently sloping and are on remnant deltas, sandbars, and low beach ridges on the lake plain and in some major valleys.

In a representative profile the surface layer is dark brown very fine sandy loam 11 inches thick. The upper 13 inches of the subsoil is friable and very friable, mottled, strong brown and brown fine sandy loam, and the lower 21 inches is mottled, reddish brown loamy fine sand with firm horizontal bands of dark reddish brown very fine sandy loam. The substratum, to a depth of 64 inches, is very friable, brown fine sand.

A temporary seasonal high water table generally is in the subsoil early in spring. In some places water moves across the top of the firm subsoil bands. Permeability is moderate in the surface layer and subsoil and moderately rapid in the substratum. Slowly permeable layers are at a depth of more than 5 feet in some areas. Most roots are confined to the upper part of the subsoil early in the growing season, but a few roots extend more deeply as the water table recedes. Available water capacity is moderate. The natural supply of total nitrogen is medium. The natural content of phosphorus is very low, and supply of available potassium is low. The natural content of lime is low to medium.

Many areas of these soils are used for row crops and vegetables. Some areas are used for hay and pasture crops and trees. Temporary seasonal wetness is the main limitation to nonfarm uses of these soils.

Representative profile of Galen very fine sandy loam, 0 to 3 percent slopes, in a cornfield 280 feet west of Beebe Bridge Road and 0.3 mile south of New Boston Road in the town of Lenox:

Ap—0 to 11 inches; dark brown (7.5YR 4/2) very fine sandy loam; weak medium and fine granular structure; friable; many fine and few medium roots; 1 percent coarse fragments; slightly acid; abrupt smooth boundary.

B21—11 to 16 inches; strong brown (7.5YR 5/6) fine sandy loam; few fine faint brown (10YR 5/3) mottles; weak fine and medium subangular blocky structure; friable; many fine roots; many fine pores; very few dark grayish brown (10YR 4/2) vertical wormcasts; medium acid; clear smooth boundary.

B22—16 to 24 inches; brown (10YR 5/3) fine sandy loam; common fine distinct strong brown (7.5YR 5/8) and reddish brown (5YR 4/4) mottles; very weak medium subangular blocky structure; very friable; common fine roots; medium acid; clear wavy boundary.

A'2&B23t—24 to 45 inches; reddish brown (5YR 5/3) loamy fine sand; common medium distinct strong brown (7.5YR 5/6) mottles; massive; very friable; few roots in upper part; patchy light reddish brown (5YR 6/3) skeletons in upper part; two dark reddish brown (5YR 3/3) very fine sandy loam B2t lamellae in lower part that have yellowish red (5YR 4/6 and 4/8) mottles; weak medium subangular blocky subangular blocky structure; firm, and few very firm nodules; common fine pores in lamellae, clay linings in pores and clay bridges between sand grains; medium acid; clear wavy boundary.

C—45 to 64 inches; brown (7.5YR 5/2) fine sand, coarser texture with increasing depth; common large distinct strong brown (7.5YR 5/8) mottles; single grain; very friable; slightly acid grading to neutral at a depth of 60 inches.

The solum is 36 to 55 inches thick. Depth to carbonates is 50 to 80 inches. Depth to bedrock is more than 5 feet. Coarse fragments generally are absent, but they make up as much as 3 percent of subhorizons in some profiles. The coarse fragments are mainly fine gravel. Reaction is strongly acid to neutral in the solum and medium acid to mildly alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma mostly of 2. Consistence is friable or very friable.

The B2 horizon ranges from fine sand to very fine sandy loam. It has hue of 10YR to 5YR, value mostly of 5, and chroma are 3 to 6. Structure is weak or very weak. Consistence is friable or very friable.

The A'2 portion of the A'2&B2t horizon ranges from loamy very fine sand to fine sand. It has color similar to that of the B2 horizon, except it has chroma mainly of 3. Consistence is very friable or loose. The B2t portion of lamellae, of the A'2&B2t horizon is fine sandy loam or very fine sandy loam. It has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 3. Mottles generally are present. Consistence is firm or friable, and very firm lumps or nodules are common. The lamellae have a total thickness of 6 to 15 inches.

The C horizon is mainly fine sand but has varves of very fine sand or has thin gravelly lens in some profiles.

Galen soils are in a drainage sequence with the well drained Arkport soils, the somewhat poorly drained Minoa soils, and the poorly drained and very poorly drained Lamson soils. They have drainage similar to that of the sandy Elnora soils but have subsoil bands (lamellae) that are finer textured and thicker than those in Elnora soils.

GaA—Galen very fine sandy lom, 0 to 3 percent slopes. This nearly level soil has the profile described as

representative of the series. It is in moderately low, slightly convex areas and receives little or no runoff from adjacent soils.

Included with this soil in mapping are small areas of somewhat poorly drained Minoa soils along drainageways and in shallow depressions. Also included are a few areas of soils with subsoil bands (lamellae) that are more than 6 inches thick or that have texture of sandy clay loam. A few small areas of soils that have a gravelly surface layer are also included and are indicated on the soil maps by the symbol for a gravelly spot.

This soil is suited to most cultivated crops and hay crops grown in the county. It is especially well suited to vegetables, but liberal applications of fertilizer are required. Randomly placed drains benefit some areas. Gravel filters or wrapped joints are required to exclude sand from subsurface drains in some areas. Wetness slightly delays tillage operations early in spring, but this friable soil is quite easy to cultivate within the proper range of moisture content. This soil can be intensively cultivated if management practices include minimum tillage, return of crop residue to the soil, and use of cover crops. These practices help to maintain good tilth and to reduce soil blowing.

If properly drained, this soil has good potential as a site for some nonfarm uses, for example, athletic fields. Sidewall instability is a problem during installation of underground utilities. Capability subclass IIw.

GaB—Galen very fine sandy loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, except mottles are fewer and less distinct in the subsoil. Slopes are mostly short and are slightly convex. The mapped areas commonly surround areas of the nearly level Galen soil. Some areas are gently undulating and have inclusions of somewhat poorly drained Minoa soils in the low areas.

Included with this soil in mapping are a few small areas of soils that have individual subsoil bands (lamellae) that are more than 6 inches thick or that have texture of sandy clay loam. Somewhat poorly drained Minoa soils in slight depressions and along drainageways and a few small spots of soils that have more than 10 percent gravel in the surface layer or subsoil are also included.

This soil is suited to cultivated crops, hay and pasture, and trees. It is well suited to vegetables, but liberal applications of fertilizer are required. Irrigation water is more difficult to apply on this soil than on the nearly level Galen soil. Erosion and soil blowing are hazards in cultivated areas and can be controlled by minimum tillage, use of cover crops, and cross slope tillage. Because this soil is free of coarse fragments and is friable, it is easy to till after it dries in spring. Tile drains benefit some fields, but filters or wrapped joints are required in some places to exclude sand from the drains.

Temporary seasonal wetness and slope are limitations to some nonfarm uses of this soil. Sidewalls are unstable during installation of underground utilities. Capability subclass IIe.

Halsey series

The Halsey series consists of deep, very poorly drained soils. These soils formed in glaciofluvial (water-laid) sand and gravel deposits that commonly are capped with local colluvium. They are nearly level and are in depressional areas of outwash plains and low stream terraces.

In a representative profile the surface layer is black silt loam 8 inches thick. The upper part of the subsoil is friable, mottled, dark gray and grayish brown very sandy loam 7 inches thick, and the lower part is friable, mottled, grayish brown gravelly fine sandy loam 11 inches thick. The substratum to a depth of 60 inches, is loose, dark brown very gravelly loamy sand.

The water table is at or near the surface for long periods during the year. Depth to the water table generally corresponds to the fluctuating level of ground water. Permeability is moderate or moderately rapid in the surface layer and subsoil and rapid in the substratum. In undrained areas rooting is mostly confined to the surface layer. In drained areas, roots extend into the substratum and available water capacity is moderate to high. The content of nitrogen is high, but nitrogen is slowly available to plants in spring when the soils are wet and cold. The supply of natural phosphorus is low, and content of potassium is medium. The natural content of lime is medium to high.

Most areas of these soils are used for trees and permanent pasture or are idle. A few areas are drained and are used for cultivated crops. Prolonged wetness is the main limitation to many nonfarm uses of these soils.

Representative profile of Halsey silt loam, in a pasture 200 feet west of East Road and 0.8 mile north of its intersection with Judd Road in the town of Cazenovia:

Ap—0 to 8 inches; black (10YR 2/1) silt loam; weak fine and medium granular structure; friable; many fine and few medium roots; 2 percent coarse fragments; slightly acid; clear smooth boundary.

B2g—8 to 15 inches; 50 percent dark gray (10YR 4/1) and 50 percent grayish brown (2.5Y 5/2) very fine sandy loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak fine and medium subangular blocky structure; friable; common fine roots; many fine pores; 5 percent coarse fragments; neutral; clear wavy boundary.

B3g—15 to 26 inches; grayish brown (2.5Y 5/2) gravelly fine sandy loam; common fine faint yellowish brown (10YR 5/4) and few fine distinct light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; friable; common fine pores; 15 percent coarse fragments; neutral; clear smooth boundary.

IIC—26 to 60 inches; dark brown (10YR 4/3) very gravelly loamy sand; common fine faint yellowish brown (10YR 5/4) mottles; single grain; loose, nonsticky when wet; 50 percent coarse fragments, the percentage increasing with increasing depth; strongly calcareous at a depth of 30 inches; mildy alkaline grading to moderately alkaline.

The solum is 22 to 32 inches thick, and carbonates are slightly below the solum. Depth to contrasting coarse textured material generally corresponds to solum thickness. Depth to bedrock is more than 6 feet. Coarse fragments are mainly gravel and make up 0 to 15 percent, by volume, of the upper part of the solum, 10 to 30 percent of the lower part of the solum, and 35 to 60 percent of the substratum. Reaction in the solum is slightly acid or neutral.

Some areas have an A1 horizon. The Ap of A1 horizon has hue of 10YR or 2.5YR, value of 2 or 3, and chroma of 1 or 2. In some profiles, a thin A2g horizon underlies the A1 or Ap horizon.

The Bg horizon is very fine sandy loam, fine sandy loam, or loam and commonly has gravelly analogues of these textures. Hue is 10YR or 2.5YR, value is 4 to 6, and chroma is 1 or 2. Common or many mottles of higher chroma are present. Structure is weak or moderate platy or subangular blocky. Consistence is friable or firm.

The IIC horizon is very gravelly loamy sand or stratified sand and gravel. Hue is 10YR or 2.5YR, value is 4 or 5, and chroma is 2 to 4. Consistence is loose to friable.

Halsey soils in Madison County have free lime (carbonates) closer to the surface than is defined as the range for the Halsey series, but this difference does not affect use and management of the soils.

Halsey soils are in a drainage sequence with the well drained and somewhat excessively drained Howard soils, the moderately well drained Phelps soils, and the somewhat poorly drained and poorly drained Fredon soils. Halsey soils formed in parent material similar to that in which those soils formed. They have drainage similar to that of Lamson soil but have a higher content of coarse fragments than those soils.

Ha—Halsey silt loam. This soil is nearly level and very poorly drained. It formed in glacial outwash deposits. It is in low areas and depressions that are mostly on valley floors but are also in islandlike areas on the lake plain. Slopes are mostly 1 percent or less. In a few areas slope ranges to as much as 3 percent. This soil receives runoff and subsurface seepage from higher adjacent soils.

Included with this soil in mapping are a few small areas of poorly drained soils and a few areas of a soil that has a mantle of silty alluvium. Some areas of soil that have a mucky surface layer are also included.

This soil is not suited to cultivated crops unless drained. Drainage is difficult to establish in some places because of a lack of suitable outlets. If outlets are available, tile drains are effective. In drained areas these soils are easy to work and to keep in good tilth if management practices include use of cover crops, return of crop residue to the soil, and minimum tillage. Pasture generally is poor in quality and is difficult to improve in undrained areas.

The prolonged high water table is the main limitation to most nonfarm uses of this soil. Some areas are best suited as open space corridors. Some areas have potential for development of wildlife marshes. Capability subclass IVw.

Hamlin series

The Hamlin series consists of deep, well drained soils that formed in silty alluvial sediment. These nearly level soils occur on flood plains along many of the major streams in the county.

In a representative profile the surface layer is dark grayish brown silt loam 11 inches thick. The subsoil is friable, brown silt loam 14 inches thick and is faintly mottled in the lower part. The upper 7 inches of the substratum is friable, grayish brown very fine sandy loam, and the lower part, to a depth of 62 inches, is friable, grayish brown very gravelly loamy sand.

These soils are subject to occasional flooding for brief periods during peak stream discharge. Flooding occurs about once in 6 years. A seasonal high water table commonly is in the upper part of the substratum for brief periods early in spring. Depth to the water table depends somewhat on the water level in the adjacent stream. Permeability is moderate above a depth of 40 inches. Rooting depth is somewhat restricted by the relatively deep water table. Available water capacity is high. The natural supply of nitrogen is medium to high, and the supply of phosphorus is medium to low. The natural content of available potassium is high. The natural content of lime is medium to high.

Most areas of these soils are used for cultivated crops and hay. A few areas are used for pasture. The hazard of flooding is the main limitation to nonfarm uses of these soils.

Representative profile of Hamlin silt loam, in a hayfield 125 feet south of Haslauer Road and 125 feet east of Oneida Creek in the town of Stockbridge:

Ap—0 to 11 inches; dark grayish brown (10YR 4/2) silt loam, brown (10YR 4/3) rubbed; moderate medium granular structure; friable; many fine and few medium roots; neutral; clear smooth boundary.

B21—11 to 27 inches; brown (7.5YR 4/4) silt loam; streaks of dark brown (10YR 4/3); weak very coarse prismatic structure parting to weak medium and coarse subangular blocky; friable; many fine and few medium roots; many fine and few large pores; few patchy clay and silt films on faces of peds and in some pores; neutral; gradual wavy boundary.

B22—27 to 35 inches; brown (10YR 4/3) light silt loam; few fine faint brown (7.5YR 4/4 - 5/4) mottles; weak medium and fine subangular blocky structure; friable; common fine and few medium roots; many fine and few medium pores; few patchy clay and silt films on faces of peds; neutral; clear wavy boundary.

C1—35 to 42 inches; grayish brown (10YR 5/2) very fine sandy loam; common medium distinct strong brown (7.5YR 5/6) and few faint olive brown (2.5Y 4/4) mottles; massive; friable; few fine roots in upper part; common fine pores; mildly alkaline; abrupt wavy boundary.

IIC2—42 to 62 inches; grayish brown (10YR 5/2) very gravelly loamy sand; many coarse distinct strong brown (7.5YR 5/6) mottles; massive; friable; common fine pores; 35 percent coarse fragments; weakly calcareous; mildly alkaline.

The solum ranges from 24 to 38 inches thick. Depth to carbonates and to contrasting material, mainly gravelly material, commonly is slightly more than 40 inches. Depth to bedrock is more than 5 feet. Coarse fragments are few or are absent to a depth of 40 inches. Reaction is slightly acid or neutral in the upper part of the solum and neutral to mildly alkaline in the lower part of the solum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. A few areas of gravel fragments cover as much as 5 percent of the surface.

The B horizon is silt loam, coarse silt loam, or very fine sandy loam. It has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. Mottles generally are present below a depth of 25 inches. Structure is weak or moderate subangular blocky, commonly within very coarse prisms. Consistence is friable or very friable.

The C horizon is silt loam or very fine sandy loam. It has hue of 10YR to 5YR, value of 4 or 5, and chroma mostly of 2.

Depth to the IIC horizon commonly is more than 40 inches. The IIC horizon ranges from fine sandy loam to loamy sand and has gravelly or very gravelly analogues of these textures. Color is similar to that of the overlying C horizon, except chroma is slightly lower in some places.

Hamlin soils are in a drainage sequence with moderately well drained and somewhat poorly drained Teel soils and poorly drained and very poorly drained Wayland soils. They formed in material similar to that in which the moderately well drained Weaver soils formed, but they are more acid than Weaver soils.

Hb—Hamlin silt loam. This soil is nearly level and formed in silty flood plain deposits along streams. Slopes are mostly 0 to 2 percent but range to 3 percent in a few areas.

Included with this soil in mapping are a few small areas of soils that have a surface layer of very fine sandy loam or fine sandy loam. Also included are moderately well drained and somewhat poorly drained Teel soils in a few small low-lying areas and along stream meander scars. Also included are a few areas of soils, mostly along high gradient streams, that have gravelly surface or subsurface layers. These areas are indicated on the soil maps by the symbol for a gravelly spot. A few areas of soils that have silty clay loam in the substratum are also included.

This soil is well suited to row crops and hay and pasture crops. It is also suited to some vegetable crops. Most flooding generally occurs early in spring and seldom delays normal tillage operations. However, some of the flooding is severe; it causes flood scour and deposits debris that is troublesome to remove. Streambank erosion is a problem in some areas, and special practices are required to control it. This soil is easy to till and is suited to intensive use of row crops if it is properly managed. Minimum tillage, return of crop residue to the soil, and use of cover crops are practices that should be included in management.

Flooding is the main limitation to the use of this soil for nonfarm-purposes. Many areas are suitable for use as open space corridors. This soil has good potential as a source of topsoil. Capability class I.

Herkimer series

The Herkimer series consists of deep, well drained and moderately well drained soils that formed in shaly alluvial fan deposits. These gently sloping soils are in places where high gradient side streams enter large valleys.

In a representative profile the surface layer is very dark grayish brown shaly silt loam 9 inches thick. The upper 7 inches of the subsoil is brown shaly silt loam, and the lower 14 inches is dark brown shaly loam. The substratum to a depth of 62 inches, is loose, dark grayish brown very shaly light loam.

In some areas, mainly in less sloping areas, a temporary seasonal high water table is in the lower part of the subsoil for brief periods early in spring during times of peak runoff and high stream discharge. Permeability is moderate. Root penetration is good and generally is unrestricted. Available water capacity is moderate to high. The natural content of nitrogen is medium. The supply of natural phosphorus is low, and content of potassium is medium. The natural content of lime is medium to low.

Most areas of these soils are used for crops that are associated with dairying. Some areas are used for pasture and trees. Temporary seasonal wetness and rare hazard of flooding are the main limitations to most nonfarm uses of these soils.

Representative profile of Herkimer shaly silt loam, 3 to 8 percent slopes, in a hayfield 250 feet west of East Lake Road and 1/4 mile south of Dam Road in the town of DeRuyter:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) shaly silt loam; moderate medium and fine granular structure; friable; many fine and few medium and coarse roots; 20 percent coarse fragments; neutral; clear smooth boundary.

B21—9 to 16 inches; brown (10YR 4/3) shaly silt loam that has variable discontinuous coarse and very coarse sand lenses; weak fine subangular blocky structure; very friable; many fine and few medium roots; many fine and few medium pores; thin clay linings in some pores; few grayish brown (10YR 5/2) skeletons on faces of peds; few dark grayish brown (10YR 4/2) organic concentrations; 25 percent coarse fragments; slightly acid; clear wavy boundary.

B22—16 to 30 inches; dark brown (10YR 3/3) shaly loam; weak fine subangular blocky structure; very friable; common fine and few medium roots; many fine pores; few clay films lining some pores; 30 percent coarse fragments; slightly acid; clear wavy boundary.

C—30 to 62 inches; dark grayish brown (10YR 4/2) very shaly light loam; very weak thick platy structure; loose; few fine roots in upper part; 40 percent coarse fragments; few cobbles at a depth of 32 inches; neutral.

The solum is 25 to 45 inches thick. Depth to carbonates is generally 40 to 75 inches. Depth to bedrock generally is more than 6 feet. Coarse fragments are mainy thin, flat shale fragments and make up 0 to 35 percent, by volume, of the solum and 20 to 55 percent of the substratum. Hard gravel or cobbles make up 5 to 30 percent, by volume. Reaction is strongly acid to neutral in the solum and is neutral or mildly alkaline in the upper part of the substratum.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2. Consistence is friable or very friable.

The B horizon is fine sandy loam, loam, or silt loam and commonly includes their shaly and gravelly analogues. Hue is 10YR or 2.5YR, value is 3 or 4, and chroma is mainly 2 or 3. In some places chroma is 4. High chroma mottles are in the lower part of the B horizon in some profiles. Structure is weak or very weak subangular blocky. Consistence is friable or very friable.

The C horizon is shaly, gravelly, or very shaly loam or silt loam. Color is similar to that of the B horizon. Structure is weak platy, or the material is massive. Consistence is very friable or loose.

Herkimer soils have fewer coarse fragments in the subsoil and are less acid than Chenango soils, which are on alluvial fans. They are near Howard and Palmyra soils on glacial terraces and have more shale fragments and are darker in color than those soils.

HeB—Herkimer shaly silt loam, 3 to 8 percent slopes. This gently sloping soil formed in shaly alluvium deposited by side streams where they enter major valleys. It is mostly well drained, but it is moderately well drained on the lower end of some fans and on a few low gradient fans. Individual areas are fan shaped.

Included with this soil in mapping are a few areas of soils that have slopes of less than 3 percent. A few small areas of nearly level, silty Hamlin soils and a few small areas of soils that have a content of coarse fragments that is more than 35 percent throughout the profile are also included.

This soil is suited to most row crops and hay crops commonly grown in the county. It is also suited to pasture and trees. The hazard of erosion is slight in the more sloping areas of this map unit. Where row crops are grown intensively, management practices should include cross slope tillage, minimum tillage, return of crop residue

to the soil, and the use of cover crops. This soil is easy to till, but the shape of some fields hinders the operation of large equipment and coarse fragments slightly hinder some precision tillage operations.

Temporary seasonal wetness, slope, and the presence of coarse fragments are limitations to some nonfarm uses. Flooding is a limitation to the use of this soil for residential and commerical development, although flooding is very rare and is of short duration. Capability subclass IIe.

Hilton series

The Hilton series consists of deep, moderately well drained soils. These soils formed in glacial till derived from red sandstone, limestone, and shale. They are nearly level and gently sloping and are on the lake plain.

In a representative profile the surface layer is dark grayish brown loam 7 inches thick. The upper 4 inches of the subsoil is friable, faintly mottled, brown loam; the next 5 inches is mottled, brown gravelly loam that has thin coatings of leached pale brown fine sandy loam; and the lower 10 inches is firm, mottled, brown gravelly loam. The substratum to a depth of 58 inches, is firm, brown gravelly loam.

A temporary seasonal high water table commonly is perched above the slowly permeable substratum in spring and in other excessively wet periods. Permeability in the surface layer and subsoil is moderate. Roots are mostly confined to the surface layer and subsoil, but some roots extend more deeply as the water table recedes late in spring. Available water capacity is moderate to high. The total natural content of nitrogen is medium. The natural supply of phosphorus is low, and the content of available potassium is medium to high. The natural content of lime is medium to high.

Most areas of these soils are used for cultivated crops and hay and pasture crops. A few areas are used for trees. Temporary seasonal wetness and slow permeability in the substratum are limitations to some nonfarm uses of these soils.

Representative profile of Hilton loam, 3 to 8 percent slopes, in a cropped field 50 feet south of Kelly Road and 1/2 mile east of State Route 13 in the town of Lenox:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam; weak fine and medium granular structure; friable; many fine and medium roots; 10 percent coarse fragments; slightly acid; abrupt smooth boundary.

B1—7 to 11 inches; brown (7.5YR 5/4) loam; few fine faint yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; many fine roots; many fine pores; few dark brown (7.5YR 4/2) wormcasts and old root channels; 12 percent coarse fragments; medium acid; clear wavy boundary.

B&A—11 to 16 inches; dark brown (7.5YR 4/4) gravelly loam; few fine faint strong brown (7.5YR 5/6) mottles; weak medium platy structure parting to weak very fine subangular blocky; friable; many fine roots; many fine pores with patchy clay linings in ped interiors; pale brown (10YR 6/3) coatings of fine sandy loam, light gray (10YR 7/2) dry, that are more than 1 millimeter thick, are on faces of peds, and contain numerous skeletons; 20 percent coarse fragments; slightly acid; gradual wavy boundary.

B2t—16 to 26 inches; brown (10YR 4/3) gravelly loam; common fine distinct strong brown (7.5YR 5/6) and few light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm; common fine roots in upper part and few fine roots in lower part; patchy thick clay films on faces of peds and lining all pores; 25 percent coarse fragments; neutral; gradual wavy boundary.

IIC—26 to 58 inches; brown (7.5YR 5/2) gravelly loam; common fine and medium distinct strong brown (7.5YR 5/6) mottles; weak thick platy structure; firm; common fine pores; pinkish gray (7.5YR 7/2) patchy secondary lime faces; 30 percent coarse fragments; few stones at a depth of 30 inches; strongly calcareous; moderately alkaline.

The thickness of the solum is 24 to 40 inches, and the range in depth to carbonates is similar. Depth to bedrock is more than 5 feet. Coarse fragments are mainly gravel and stones of mixed lithology and include fragments of limestone, shale, and sandstone. Coarse fragments make up 3 to 30 percent of the solum and as much as 40 percent of the lower part of the substratum. Reaction is strongly acid to slightly acid in the upper part of the solum and slightly acid or neutral in the lower part of the solum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma mainly of 2.

The B1 horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 to 4. In some places there is an A2 horizon instead of a B1 horizon.

The B&A horizon is sandy clay loam or loam, and gravelly analogues are common. Ped exteriors generally have color similar to that of the B1 or A2 horizons. Ped interiors have color similar to that of the B2t horizon. Structure is weak platy or subangular blocky.

The B2t horizon is fine sandy loam, loam, or sandy clay loam, and gravelly analogues are common. Clay content ranges from 18 to 27 percent. Hue is 10YR to 5YR, value is 4 or 5, and chroma is 3 or 4. Structure is medium or coarse subangular blocky.

The C horizon ranges from very gravelly, gravelly, or stony fine sandy loam to loam. Structure is platy, or the material is massive. Consistence is firm or very firm.

Hilton soils are in a drainage sequence with well drained Ontario Variant soils, somewhat poorly drained Appleton soils, and poorly drained and very poorly drained Lyons soils. They are similar to Lima soils but have a thicker solum and a higher content of sand than those soils.

HlA—Hilton loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, except mottles are slightly more distinct and more numerous below the surface layer. Because excess water is removed slowly, this soil is in the wetter half of the moderately well drained class. Slopes are slightly convex.

Included with this soil in mapping are somewhat poorly drained Appleton soils and poorly drained Lyons soils in a few small slight depressions. The more prominent areas of these included soils are indicated on the soil maps by the symbol for a wet spot. Also included are a few large areas of soils that have a coarser textured subsoil with less than 18 percent clay around the village of Whitelaw in the town of Lenox.

This soil is suited to cultivated crops, hay and pasture crops, and trees. In some years tillage is slightly delayed in spring because of temporary wetness. Randomly placed drains for wet areas improve many fields. This soil is easy to till, but in some places stones on the surface slightly hinder some tillage operations. Where row crops are grown intensively, management practices including use of cover crops, return of crop residue to the soil, and minimum tillage help to maintain good soil tilth and to conserve moisture.

Brief seasonal wetness and slow permeability in the substratum are limitations to some nonfarm uses of this soil. If this soil is used for homesites, the site should be carefully selected and the drainage system and filter field should be properly designed to offset these limitations. Capability subclass IIw.

HlB—Hilton loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. Slopes are slightly convex, and in some areas they are undulating. This soil commonly receives a small amount of runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of somewhat poorly drained Appleton soils in slight depressions and along field drainageways. Also included, around Whitelaw in the town of Lenox, are a few large areas of soils that have a coarser textured subsoil with less than 18 percent clay. A few small areas of nearly level Hilton soils on ridgetops are also included.

This soil is suited to most of the cultivated crops grown in the survey area and to hay and pasture crops and trees. In cultivated areas erosion is a hazard if the soil is left unprotected. Cross slope tillage, use of cover crops and minimum tillage are practices that reduce erosion and help to maintain good soil tilth. Brief seasonal wetness slightly delays tillage early in spring. Interceptor drains or randomly placed drains for included wet spots benefit many areas. Stones on the surface hinder some tillage operations in places.

Temporary seasonal wetness, slow permeability in the substratum, and slope are limitations to the use of this soil for nonfarm purposes. If this soil is used for homesites, drainage generally is needed around basements and filter fields should be properly designed to offset these limitations. Capability subclass IIe.

Honeoye series

The Honeoye series consists of deep, well drained soils. These soils formed in glacial till derived from limestone and shale. They are gently sloping to steep and are on the upland plateau and along dissected valley sides mostly at an elevation of less than 1,400 feet.

In a representative profile the surface layer is very dark grayish brown silt loam 9 inches thick. The subsurface layer is leached, brown silt loam 5 inches thick. The upper 5 inches of the subsoil is friable, brown silt loam, and the lower 10 inches is firm, dark brown gravelly heavy silt loam. The substratum, to a depth of 62 inches, is firm, dark grayish brown gravelly silt loam and has distinct mottles in the lower part.

A seasonal high water table commonly is perched above the slowly permeable substratum for very brief periods in spring, especially in the less sloping areas. Permeability is moderate in the surface layer and subsoil. Root development is good in these soils, but deep root penetration is somewhat restricted by the firm, calcareous substratum. Available water capacity is moderate to high. The natural content of nitrogen is medium. The supply of natural phosphorus is low, and content of available potassium is high. The natural content of lime is high.

Many areas of these soils are used intensively for cultivated crops. Some areas are used for hay and pasture, and some steeper areas are used for trees. Slow permeability in the substratum is the main limitation to nonfarm uses of these soils.

Representative profile of Honeoye silt loam, 3 to 8 percent slopes, in a hayfield north of Owahgena Road and 1/4 mile west of West Lake Road in the town of Cazenovia:

Ap—0 to 9 inches, very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; very friable; many fine and common medium roots; 5 percent coarse fragments; slightly acid; abrupt smooth boundary.

A2—9 to 14 inches; brown (10YR 5/3) silt loam; weak medium and fine subangular blocky structure; friable; many fine and common medium roots; many fine pores; common vertical dark grayish brown (10YR 4/2) organic stains; 8 percent coarse fragments; neutral; clear wavy boundary.

B&A—14 to 19 inches; brown (10YR 4/3) silt loam; moderate medium and fine subangular blocky structure; friable; many fine and few medium roots; many fine and few medium pores; few large pores with dark organic stains; thin clay linings in pores; coatings of brown (10YR 5/3) light silt loam, very pale brown (10YR 7/3) dry, 2 millimeters thick on faces of peds; 10 percent coarse fragments; neutral; clear wavy boundary.

B2t—19 to 29 inches; dark brown (10YR 4/3) gravelly heavy silt loam; few fine faint yellowish brown (10YR 5/4) mottles in lower 3 inches; moderate coarse and medium subangular blocky structure; firm and slightly sticky; common fine roots; common medium pores and few large worm channels; moderately thick patchy clay films on faces of peds and thick clay films lining pores; 15 percent coarse fragments; common dark soft shale fragments; neutral; clear wavy boundary.

C—29 to 62 inches; dark grayish brown (10YR 4/2) gravelly silt loam; massive; firm; few fine pores; few patchy clay linings in pores; common medium distinct yellowish brown (10YR 5/4) and faint grayish brown (10YR 5/2) mottles at a depth of more than 48 inches; 25 percent coarse fragments; common fine dark shale chips; strongly calcareous; moderately alkaline.

The thickness of the solum and the depth to carbonates range from 20 to 32 inches. Depth to bedrock generally is more than 5 feet. Coarse fragments are dominantly limestone and shale. They make up 5 to 30 percent of the solum, and the percentage increases in the substratum. Very dark gray or red shale fragments are common, and where present they strongly influence the color of the soil. Reaction is medium acid to neutral in the upper part of the solum and slightly acid or neutral in the lower part of the solum.

The Ap horizon is mostly silt loam but ranges to cherty silt loam. Hue is 10YR or 7.5YR, value is 3 to 5, and chroma is mainly 2.

Some areas do not have an A2 horizon. The A2 horizon is loam or silt loam. Hue is 10YR or 7.5YR, value is 5 or 6, and chroma is 2 or 3.

In the B&A horizon, 60 to 90 percent of the soil material is similar to that in the B horizon. The A portion has color and texture similar to those of the A2 horizon. The B portion is loam or silt loam, and gravelly analogues are common. Hue is 10YR to 5YR, value is 3 to 5, and chroma is mainly 3.

The Bt horizon ranges from loam to heavy silt loam and commonly includes gravelly analogues. Color is similar to that of the B portion of the B&A horizon. Structure is weak or moderate. Consistence is friable or firm. Few faint high chroma mottles are in the lower part in some profiles.

The C horizon ranges from very gravelly fine sandy loam to gravelly silt loam. Stones and cobbles commonly are present. Consistence is firm or very firm.

Honeoye soils are in a drainage sequence with moderately well drained Lima soils, somewhat poorly drained Appleton soils, and poorly drained and very poorly drained Lyons soils, and they formed in parent

material similar to that in which those soils formed. Honeoye soils are near Lansing soils. They formed in till deposits similar to those in which Lansing soils formed but have a thinner solum and are calcareous at a shallower depth than Lansing soils.

HnB—Honeoye silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It receives no runoff from higher soils. Many areas of this soil are undulating and convex and are dissected in places by shallow drainageways. Some areas are oblong in shape and consist of convex hilltops.

Included with this soil in mapping are small areas of somewhat poorly drained Appleton soils and moderately well drained Lima soils mostly in shallow drainageways. The more prominent areas of these soils are identified on the soil maps by the symbol for a field drainageway. Moderately well drained Lima soils in a few less sloping areas on broad hilltops are also included.

This soil is well suited to corn, small grain, and hay mixtures of alfalfa and grass. It is also well suited to cash crops, for example, dry beans and wheat. Erosion is a hazard in intensively cultivated areas. Practices to control erosion are easy to use on these soils. Tillage is not difficult except for stones on the surface in places. Randomly placed drains for the included wet spots improve many fields.

This soil is suited to many nonfarm uses. However, slow permeability in the substratum is a limitation to some nonfarm uses, for example, septic effluent fields. Capability subclass IIe.

HnC—Honeoye silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, except the surface layer and subsoil are slightly thinner. Slopes are slightly convex. This soil commonly receives runoff from higher adjacent soils, for example, gently sloping Honeoye soils. Runoff is rapid.

Included with this soil in mapping are a few areas of soils that have slopes of 15 to 20 percent. Also included are a few small areas of moderately well drained Lima soils along shallow drainageways and on the base of longer slopes. In the west-central portion of the county, a few large areas of a soil that is darker in color because of a high content of dark shale are also included.

This soil is suited to cultivated crops, hay and pasture, and trees. Where row crops are grown, the hazard of erosion is severe if the soil is unprotected. The size and shape of most areas are suitable for the use of conservation practices to control runoff and erosion. These practices include cross slope tillage, use of cover crops, minimum tillage, diversions, and stripcropping where practical. Dissected areas are better suited to pasture or trees than to row crops. In some places stones on the surface hinder some tillage operations.

Slow permeability in the substratum and slope are the main limitations to the use of this soil for nonfarm purposes. Many areas have scenic value for homesites, but special measures are needed to offset the soil limitations. Capability subclass IIIe.

HnD—Honeoye silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, except the surface layer and subsoil are thinner and the lower part of the subsoil is not mottled. Slopes are slightly convex or smooth. This soil receives runoff from higher adjacent soils. It is on side slopes or upland hills and on dissected valley sides.

Included with this soil in mapping are a few small areas of moderately well drained Lima soils in drainageways. Also included are a few areas of steep Honeoye soils that are mostly on dissected side slopes. These steep areas are identified on the soil maps by the symbol for a nonbedrock escarpment. A few areas of severely eroded soils are also included.

This soil is better suited to hay and pasture crops and to trees than to cultivated crops. Because of the moderately steep slopes, the hazard of erosion is severe in cultivated areas and the use of modern farm equipment is difficult. Runoff is rapid. Because the slope increases runoff and reduces the available water capacity, plants generally show moisture stress earlier in the growing season than plants grown on less sloping Honeoye soils. If row crops are grown, they should be grown infrequently and a maximum of soil and water conservation practices should be used.

Slope and slow permeability in the substratum are major limitations to nonfarm uses. In urban areas this soil is best suited to use as woodland or open space corridors. Capability subclass IVe.

HnE—Honeoye silt loam, 25 to 50 percent slopes. This steep soil has a profile similar to the one described as representative of the series, except the calcareous till substratum is closer to the surface and the lower part of the subsoil is not mottled. This soil is mainly along dissected valley sides. It receives runoff from higher soils.

Included with this soil in mapping are a few areas of very steep Lansing soils, which are similar to this Honeoye soil but are more acid. A few small seep spots and springs at the base of slopes, some areas of severely eroded and gullied soils, and a few areas of stony soils are also included.

This soil is best suited to trees. Pastures are poor in quality because of droughtiness in summer and the difficulty in reseeding and in applying fertilizer. This soil is too steep to be used for cultivated crops. Many areas remain uncleared.

Slope is a severe limitation to nonfarm uses. Most areas are best suited as open space corridors. Capability subclass VIe.

HOE—Honeoye-Farmington complex, steep. This map unit consists of about 45 percent Honeoye soil and 40 percent Farmington soil. These soils form such an intricate pattern on the landscape that it was not feasible to map them separately at the scale used. The surface layer is mostly silt loam and cherty silt loam. These soils have a profile similar to the one described as representative of the series, except the Honeoye soil is shallower to

limestone bedrock and has a surface layer of cherty silt loam in places. Slopes range from 25 to 65 percent.

Included with these soils in mapping are a few areas of steep and very steep Wassaic soils and very steep Honeoye and Farmington soils. Rock outcrop makes up as much as 10 percent of some mapped areas. A few areas of stony soils and a few very small seep spots and springs are also included.

This map unit is not suitable for cultivated crops, and pasture is poor in quality. Most areas of this map unit are best suited to trees. Droughtiness is a problem because of very rapid runoff and the shallow depth to bedrock in some areas. A plant cover is needed to protect these soils from severe erosion.

Slope is the main limitation to nonfarm uses. A few areas are stripped of soil and are quarried for limestone. Many areas have a scenic view overlooking the lake plain and Oneida Lake and have potential as parkland or as open space corridors. Capability subclass VIIe.

Howard series

The Howard series consists of deep, well drained and somewhat excessively drained soils. These soils formed in glaciofluvial (water-laid) deposits that are mainly sand and gravel. The deposits were derived mainly from shale and sandstone and also from limestone. They are nearly level to hilly and are on valley terraces, outwash plains, and kame moraines.

In a representative profile the surface layer is dark grayish brown gravelly silt loam 8 inches thick. The upper part of the subsurface layer is dark yellowish brown gravelly silt loam 6 inches thick, and the lower part is brown very gravelly loam 3 inches thick. The upper part of the subsoil is brown, friable very gravelly light loam 7 inches thick that has thin coatings of leached brown material, and the lower part is dark brown, friable very gravelly loam 11 inches thick. The substratum, to a depth of 60 inches, is dark brown very gravelly fine sand grading to stratified sand and gravel.

The seasonal high water table is generally at a depth of more than 6 feet. Permeability is moderate to moderately rapid in the surface layer and subsoil and is very rapid in the substratum. Rooting depth is unrestricted in the subsoil, and some taproots extend to the coarse textured substratum. Available water capacity is very low to moderate. These soils dry and warm rapidly in spring. The natural supply of nitrogen is medium. The content of natural phosphorus is low, and the content of potassium is medium to low. The natural content of lime is medium or low.

Many areas of these soils are used for cultivated crops and hay crops that are associated with dairy farming. Some areas are used for pasture, and a few areas are used for trees. There are few limitations to nonfarm uses that require good drainage.

Representative profile of Howard gravelly silt loam, undulating, in a hayfield 100 yards north of Carey Road and 1/4 mile east of River Road in the town of Eaton:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) gravelly silt loam, rubbed; moderate medium granular structure; friable; many fine and common medium roots; 20 percent coarse fragments; slightly acid; clear smooth boundary.

A21—8 to 14 inches; dark yellowish brown (10YR 4/4) gravelly silt loam; very weak medium subangular blocky structure; very friable; many fine and few medium roots; many fine pores; few vertical dark grayish brown (10YR 4/2) organic stains and wormcasts; 25 percent coarse fragments; slightly acid; clear wavy boundary.

A22—14 to 17 inches; brown (10YR 4/3) very gravelly loam; weak medium and fine subangular blocky structure; friable; common fine roots; many fine and common medium pores; few vertical dark grayish brown (10YR 4/2) organic root stains and worm casts; 35 percent coarse fragments; medium acid; clear wavy boundary.

B&A—17 to 24 inches; brown (7.5YR 4/2) very gravelly light loam; weak fine subangular blocky structure; friable; common fine roots; many fine and medium pores; clay linings in pores and clay coatings on many pebbles; brown (7.5YR 5/2) coatings, light gray (10YR 7/2) dry, more than 1 millimeter thick that are on faces of peds and have many skeletons; 50 percent coarse fragments; medium acid; gradual wavy boundary.

B2t—24 to 35 inches; dark brown (7.5YR 4/2) very gravelly loam; weak fine and medium subangular blocky structure; friable and slightly sticky; few fine roots; common fine pores; clay bridges between sand grains; thick clay films on some pebbles and in pores; discontinuous clay films on weak faces of peds; 55 percent coarse fragments; neutral; gradual wavy boundary.

C—35 to 60 inches; dark brown (7.5YR 3/2) very gravelly fine sand grading to stratified sand and gravel in the lower part; single grain; very friable; 60 percent coarse fragments, numerous dark shale chips; weakly calcareous; mildly alkaline.

The thickness of the solum and the depth to carbonates range from 28 to 48 inches. Tonguing of material from the B horizon into the C horizon accounts for the wide range in the thickness of the solum. Depth to bedrock is more than 8 feet. Coarse fragments are mainly mixed gravel and cobbles of sandstone, siltstone, shale, and limestone. Coarse fragments make up 5 to 40 percent of the upper part of the solum and 40 to 60 percent of the lower part of the solum and the substratum. Unless the soil is limed, reaction is medium acid or slightly acid in the upper part of the solum and medium acid to neutral in the lower part of the solum.

Some areas have an A1 horizon. The Ap or A1 horizon is gravelly silt loam or fine sandy loam. Hue is 10YR or 7.5YR, value is 3 or 4, and chroma is 2 or 3.

The A2 horizon ranges from sandy loam to silt loam and includes gravelly and very gravelly analogues of these textures. Hue is 10YR to 5YR, value is 4 or 5, and chroma is 3 or 4. Consistence is friable or very friable. Some profiles have an A&B horizon.

The B&A horizon ranges from sandy loam to silt loam, and gravelly and very gravelly analogues are common. The B portion of the B&A horizon has hue of 10YR to 5YR, value of 3 or 4, and chroma of 2 to 4. The A portion also has hue of 10YR to 5YR, but it has value of 4 to 6 and chroma of 2 or 3.

The Bt horizon ranges from very gravelly sandy loam to very gravelly sandy clay loam. Color is similar to that of the B portion of the B&A horizon. Consistence is friable or firm.

The C horizon is very gravelly fine sand or very gravelly sand and commonly is stratified. Inherited dark shale accounts for dark colors in some profiles. Consistence is very friable or loose.

Howard soils are in a drainage sequence with moderately well drained Phelps soils, somewhat poorly drained and poorly drained Fredon soils, and very poorly drained Halsey soils. They are similar to Palmyra soils but have less clay and more coarse fragments in the subsoil than Palmyra soils.

HwA—Howard fine sandy loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative for the series, except the surface layer is fine sandy loam. It is on valley terraces

and outwash plains that are mantled with deposits of fine sand.

Included with this soil in mapping are soils similar to Arkport soils in places where the sandy mantle is thicker. Also included are a few areas of soils that have a surface layer of gravelly fine sandy loam and a few areas of silty soils that are about 40 inches deep to gravelly material.

This soil is suited to cultivated crops and hay. Early season crops grow exceptionally well. Droughtiness is a problem in midsummer in most years, especially if shallow-rooted crops are grown. This soil is suited to vegetables in some areas, but irrigation may be required to obtain optimum yields. This soil is easier to irrigate than more sloping phases of Howard soils. Also, it generally is less droughty and easier to till than the nearly level, more gravelly Howard soil. The hazard of soil blowing is slight in exposed areas.

This soil has few or no limitations to nonfarm uses that require good drainage. Many areas have excellent potential for residential development. Pollution of the underlying ground water is a slight hazard for some nonfarm uses because of very rapid permeability in the substratum. Capability subclass IIs.

HwB—Howard fine sandy loam, undulating. This gently sloping soil has a profile similar to the one described as representative of the series, except the surface layer is sandier. It commonly is on valley terraces that are mantled with deposits of fine sand. In some areas slopes are slightly convex and simple. Slopes range from 3 to 8 percent.

Included with this soil in mapping are a few areas of soils that have a very gravelly surface layer in places where the sandy mantle is thinner. These areas are indicated on the soil maps by the symbol for a gravelly spot. Also included are a few small areas of Arkport soils in places where the sandy mantle is thicker. A few areas of a soil that have a silty mantle that is about 40 inches deep to sand and gravel deposits are also included.

This soil is suited to cultivated crops and hay. Droughtiness is a problem in midsummer, especially if shallow-rooted crops are grown. In some places irrigation is required if high value crops are grown. The hazards of erosion and soil blowing are slightly greater than on more gravelly phases of Howard soils. Use of cover crops, minimum tillage, and cross slope tillage where practical are measures that reduce erosion and help to maintain good soil tilth. Because the surface layer is free of coarse fragments, this soil is easier to till than gravelly phases of Howard soils. This soil has excellent response to the application of large amounts of fertilizer if sufficient moisture is available to crops.

Slope is a limitation to some nonfarm uses, for example, athletic fields, that require good drainage. Many areas have excellent potential as homesites. Capability subclass IIs.

HxA—Howard gravelly silt loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, except the surface layer and subsoil are slightly thicker. It is mostly on high valley terraces.

Included with this soil in mapping are a few small areas of moderately well drained Phelps soils in slight depressions. In the extreme southern part of the county, a few small areas of a soil that is similar to this Howard soil but is more acid and does not have a clay increase in the subsoil are also included.

This soil is suited to cultivated crops and hay, especially to early season crops. Only a small amount of moisture is lost through runoff, but droughtiness is a problem during the drier summer months, especially if shallow-rooted crops are grown. Precision tillage operations are more difficult on this soil than on sandier phases of Howard soils, because of the presence of coarse fragments. Minimum tillage can be used in most areas. This soil has excellent response to the application of large amounts of fertilizer if sufficient moisture is available to crops. It is easier to irrigate than more sloping phases of Howard soils.

This soil has few limitations to most nonfarm uses that require good drainage. However, there is a hazard of pollution of ground water because of very rapid permeability in the substratum. Also, the presence of coarse fragments is a limitation to some uses. Capability subclass IIs.

HxB—Howard gravelly silt loam, undulating. This soil has the profile described as representative of the series. It is on high terraces and outwash plains. Slopes range from 3 to 8 percent. In some areas slopes are plane and simple.

Included with this soil in mapping are a few small areas of moderately well drained Phelps soils and a few small areas of somewhat poorly drained and poorly drained Fredon soils in depressions. Also included are a few areas of nearly level Howard soils and a soil that is more acid and is slightly coarser textured than this Howard soil.

This soil is suited to cultivated crops and hay. Early season crops grow well. Droughtiness during the drier summer months is a problem, especially for shallow-rooted crops. This soil is more difficult to irrigate than nearly level phases of Howard soils. The hazard of erosion is slight in cultivated areas, and erosion is less serious on this soil than on the gently sloping, sandier phase of Howard soil. Minimum tillage, use of cover crops, and cross slope tillage where practical reduce erosion, conserve moisture, and help to maintain good soil tilth. Coarse fragments in this soil are more of a hindrance to precision planting and harvesting operations than the fragments in sandier phases of Howard soils.

Slope and the presence of coarse fragments are limitations to some nonfarm uses. Pollution of the water table, which is deep in the substratum, is a hazard to the use of this soil for some purposes. Many areas have excellent potential as homesites. Capability subclass IIs.

HxC—Howard gravelly silt loam, rolling. This soil has a profile similar to the one described as representative of the series, except gravel content in the surface layer is slightly higher. Slopes range from 8 to 15 percent. Some areas along terrace fronts have plane, simple slopes.

Included with this soil in mapping are a few small areas of somewhat poorly drained and poorly drained Fredon soils or very poorly drained Halsey soils in deep depressions. Also included are a few spots of eroded soils and a few small areas of soils that have a surface layer of gravelly fine sandy loam.

This soil is suited to some cultivated crops, hay and pasture, and trees. Erosion is a hazard in cultivated areas that are not protected. Where slopes are complex, contour farming generally is not feasible. However, minimum tillage, use of cover crops, and including a high proportion of sod crops in the cropping system are practices that reduce erosion and help to increase the available water capacity. Because runoff is more rapid on this soil than on less sloping phases of Howard soils, this soil generally is more droughty. Slope and coarse fragments hinder some tillage operations.

Slope is a limitation to many nonfarm uses that require good drainage. Homesites should be carefully selected. Some areas have excellent potential as a source of sand and gravel. Capability subclass IIIe.

HxD—Howard gravelly silt loam, hilly. This soil has a profile similar to the one described as representative of the series, except the surface layer and subsoil are thinner because of erosion. Slopes range from 15 to 25 percent. This soil is mostly on kame moraines that have complex slopes. It is also on long, narrow terrace fronts that have simple slopes.

Included in mapping with this soil are a few areas of severely eroded soils and a few small areas of soils that have a surface layer of very gravelly fine sandy loam or gravelly fine sandy loam. A few small spots of somewhat poorly drained and poorly drained Fredon soils and very poorly drained Halsey soils in deep depressions and in seep areas on foot slopes are also included.

This soil is suited to pasture and trees. Because of the moderately steep slopes, tillage is difficult and somewhat hazardous. The hazard of erosion is severe in cultivated areas that are unprotected. Cultivated crops should be grown only occasionally and in a cropping system that consists mainly of sod crops. Contour tillage generally is not practical because of the complex slopes. Pasture commonly is poor in quality because of the lack of moisture in midsummer.

Slope is the main limitation to most nonfarm uses of this soil. Many areas have potential as a source of sand and gravel. Capability subclass IVe.

Lairdsville series

The Lairdsville series consists of moderately deep, moderately well drained and well drained soils. These soils formed in glacial till and in congeliturbate deposits mixed with residuum derived from the underlying soft shale bedrock. They are gently sloping to steep and are on the northern edge of the upland plateau.

In a representative profile the surface layer is dark reddish brown silt loam 8 inches thick. The upper 4 inches of the subsoil is firm, dark reddish brown silty clay loam that has thin coatings of leached, reddish brown silty material. The lower 15 inches of the subsoil is firm, mottled, dark reddish brown heavy silty clay loam. The substratum is firm, mixed weak red and olive shaly clay loam and very shaly clay loam. Soft, olive gray and weak red clay shale is at a depth of 33 inches.

A seasonal high water table commonly is perched above the bedrock or substratum for brief periods in spring. Soft shale bedrock is at a depth of 20 to 40 inches. Permeability is moderate in the surface layer and very slow below that. The dense, fine textured subsoil and the underlying soft shale bedrock somewhat restrict root penetration and development. Available water capacity is moderate to low. The natural content of nitrogen generally is medium, except in severely eroded areas it is low. The natural supply of phosphorus is low to medium and the content of available potassium is high. The natural content of lime is medium to high.

Most areas of these soils are in hay and pasture or are idle. Some areas are used for cultivated crops and trees. Depth to bedrock, very slow permeability, and fine texture in the subsoil are the main limitations to nonfarm uses of these soils.

Representative profile of Lairdsville silt loam, 3 to 8 percent slopes, in a reforested area 30 feet west of Harp Road and 0.4 mile south of State Route 5 in the town of Lincoln:

Ap—0 to 8 inches; dark reddish brown (5YR 3/2) silt loam, dark reddish gray (5YR 4/2) rubbed; moderate medium subangular blocky structure parting to weak fine granular; friable; 10 percent coarse fragments; many fine roots; slightly acid; abrupt smooth boundary.

B&A—8 to 12 inches; dark reddish brown (5YR 3/3) silty clay loam; strong medium subangular blocky structure; firm and sticky; many fine roots; common fine pores; clay linings in pores; reddish brown (5YR 5/4) vertical silty coatings more than 1 millimeter thick on faces of peds; few dark reddish brown (5YR 3/2) wormcasts or organic stains, or both in vertical macropores; 8 percent coarse fragments and few disintegrating olive shale fragments; neutral; gradual wavy boundary.

B2t—12 to 27 inches; dark reddish brown (2.5YR 3/4) heavy silty clay loam; few fine faint yellowish red (5YR 4/6) mottles in lower part; strong coarse angular blocky structure; firm and very sticky; common fine roots mostly along faces of peds; few fine pores; clay linings in pores; reddish brown (5YR 5/3) thick distinct clay films on faces of peds; few dark reddish brown (5YR 3/2) macropores; 5 percent hard coarse fragments; olive gray (5Y 5/2) disintegrating soft shale fragments increase to 20 percent in lower part; neutral; gradual wavy boundary.

IIC—27 to 30 inches; mixed weak red (2.5YR 4/2) and olive (5Y 5/3) shaly clay loam; weak thick and medium platy structure; firm and slightly sticky; 30 percent soft olive shale fragments; some clay flow in pores; mildly alkaline; clear wavy boundary.

IIIC—30 to 33 inches; olive (5Y 5/3) very shaly clay loam; many variegated red and yellow mottles; moderate medium and thick platy structure; firm and slightly sticky; 50 percent soft disintergrating olive shale fragments; mildly alkaline.

IIIR—33 inches; olive gray (5Y 5/2) interbedded with weak red (2.5YR 4/2) shale bedrock; easily cut with spade in upper part; weakly calcareous; mildly alkaline.

The thickness of the solum ranges from slightly less than 20 inches to about 40 inches. Depth to bedrock is 20 to 40 inches. Coarse fragments are dominantly soft red and olive shale but include hard sandstone and

limestone gravel. Coarse fragments make up 2 to 30 percent of the solum, and the percentage commonly increases with increasing depth. Reaction is medium acid to mildly alkaline in the solum and neutral or mildly alkaline in the substratum. Free carbonates are in the lower part of the profile in some places.

The Ap horizon is silt loam or silty clay loam. Hue is 7.5YR or 5YR, value is 3 to 5, and chroma is 2 or 3. Consistence is friable or firm. Thin A1 and A2 horizons are in some undisturbed areas.

In the B&A horizon, texture of the fine earth fraction is mainly silty clay loam, clay loam, or silty clay. Hue is 7.5YR to 10YR, value is 3 to 5, and chroma is 2 to 5. Ped exteriors are silty and have color value higher than that of ped interiors. Structure is strong or moderate blocky or prismatic.

The Bt horizon ranges from silty clay or clay to clay loam, and shaly analogues are common. Clay content is more than 35 percent. Color and structure are similar to those in the B portion of the B&A horizon. High chroma mottles are in the lower part in some profiles. Consistence is firm or very firm.

The thin C horizon, where present, ranges from shaly or very shaly clay or silty clay to clay loam.

The R horizon is dominantly red and olive, weakly calcareous shale that is soft in the upper part.

Lairdsville soils are in a drainage sequence with somewhat poorly drained Lockport soils. They are near moderately deep Camillus soils. They are similar to Camillus soils but have a finer textured subsoil than those soils.

LaB—Lairdsville silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. Slopes are convex; in many areas they are simple and uniform, and in some areas they are gently undulating. This soil receives little or no runoff from higher adjacent soils.

Included with this soil in mapping are a few areas of somewhat poorly drained Lockport soils in nearly level spots and along shallow drainageways. Also included, west of the village of Canastota, is a small area of soils that have texture similar to that of this Lairdsville soil but are gray to olive in color. A few areas of eroded soils that have a surface layer of silty clay loam are also included.

This soil is moderately well suited to cultivated crops and is suited to hay and pasture crops and trees. In some years temporary seasonal wetness briefly delays normal tillage operations in spring. Management practices, including cultivation at the proper moisture content, are needed to minimize surface clodding and crusting. The use of sod crops and cover crops helps to improve soil tilth and to reduce the slight to moderate hazard of sheet erosion. Controlling erosion is important because exposure of the fine textured subsoil causes further difficulties in management and reduces available water capacity.

Moderate depth to bedrock, temporary seasonal wetness, very slow permeability, and fine texture in the subsoil are limitations to many nonfarm uses. Low strength is a limitation to the use of this soil for some structures, for example, roads. Capability subclass IIe.

LbC—Lairdsville silty clay loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, except the surface layer is silty clay loam. Slopes are mostly simple and broad, but short, rolling, complex slopes are common in some areas. This soil generally receives some runoff from higher adjacent soils.

Included in mapping are some large areas of soils that have a surface layer of heavy silt loam. Also included, west of the village of Canastota, are soils that are olive to gray in color. Some large areas of severely eroded soils are also included; these soils commonly have moderately deep gullies cutting into the underlying shale bedrock.

This soil is suited to hay and pasture crops and trees and can be used for cultivated crops in some years. However, because of rapid runoff, the severe hazard of erosion, and poor soil tilth, it is better suited to sod crops than to cultivated crops. A high level of management and a maximum of conservation practices are required to control erosion and maintain good soil tilth. This soil generally is more droughty than less sloping Lairdsville soils.

Moderate depth to bedrock, fine texture in the subsoil, very slow permeability, and slope are limitations to many nonfarm uses. Some areas are suited to development of wildlife habitat or to reforestation. Capability subclass IIIe.

LbD3—Lairdsville silty clay loam, 15 to 25 percent slopes, severely eroded. This moderately steep soil has a profile similar to the one described as representative of the series, except the surface layer is mixed with the finer textured subsoil because of erosion. Slopes are slightly convex to smooth. The mapped areas are dissected by numerous shallow drainageways, and some areas are dissected by gullies that cut into the underlying shale bedrock. This soil generally receives a moderate amount of runoff from higher adjacent soils. It is mainly well drained.

Included with this soil in mapping are a few areas of uneroded soils, mostly in woodland. Also included are a few areas of very severely eroded soils and a few areas of Camillus soils. A soil that is similar to this Lairdsville soil but is olive or gray in color is also included, mostly in a small area west of the village of Canastota.

Because of slope and the severe hazard of further erosion, this soil generally is unsuited to cultivated crops. It is better suited to long term pasture and to trees. Because of rapid runoff, moderate depth to bedrock, and poor soil tilth, less water is available to plants than on gently sloping Lairdsville soils. Drought-tolerant pasture plants grow best. Tillage for reseeding is difficult because of slope, surface clodding, and the presence of dissecting drainageways and gullies.

Slope, moderate depth to bedrock, fine texture in the subsoil, and very slow permeability are limitations to the use of this soil for nonfarm purposes. Some areas have potential for development of wildlife habitat or for reforestation. Capability subclass VIe.

LbE3—Lairdsville silty clay loam, 25 to 40 percent slopes, severely eroded. This steep soil has a profile similar to the one described as representative of the series, except the surface layer is silty clay loam and the depth to bedrock is less because of erosion. Slopes are short. The areas are dissected by numerous drainageways and by some moderately deep and deep gullies. This soil generally receives runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of coarser textured Camillus soils. Also included are a few areas where shale bedrock crops out, a few areas of soils that have slopes of less than 25 percent, and a few large areas of very severely eroded soils.

This soil is suited to long term pasture but is better suited to trees. Drought-tolerant tree species grow best. Because runoff is very rapid, water infiltration is low and the hazard of further erosion is very severe. Operation of heavy equipment is very difficult because of slope and the presence of dissecting gullies.

Steep slopes, moderate depth to bedrock, and very slow permeability are severe limitations to nonfarm uses. Many areas are best suited as wooded open space or to development of wildlife habitat. Capability subclass VIIe.

Lakemont series

The Lakemont series consists of deep, poorly drained and very poorly drained soils. These soils formed in reddish glaciolacustrine (lake-laid) deposits that are mainly clay and silt. They are nearly level and are mostly in low areas on the lake plain.

In a representative profile the surface layer is very dark grayish brown heavy silt loam 7 inches thick. The subsoil is mottled, firm, dark reddish gray, and reddish gray silty clay loam and silty clay 28 inches thick. It is very sticky and very plastic in the middle part. The substratum, to a depth of 62 inches, is varved silty clay loam and silt.

A seasonal high water table is at or near the surface for long periods in spring. In some areas these soils are subject to ponding for brief periods early in spring. Permeability is moderately slow in the surface layer and very slow in the subsoil and substratum. Rooting depth depends on the depth to the water table, but in undrained areas most roots are confined to the surface layer. In drained areas available water capacity is moderate to high to a depth of 40 inches. The total natural content of nitrogen is high, but nitrogen is released slowly to plants when the soils are damp and cold. The content of phosphorus is low to medium, and supply of available potassium is high. The natural content of lime is medium to high.

Most areas of these soils are used for pasture and trees or are idle. A few areas are drained and are used for cultivated crops. Prolonged wetness is the main limitation to nonfarm uses of these soils.

Representative profile of Lakemont silt loam, in a hayfield 50 feet east of Fly Road and 0.3 mile south of Swamp Ridge Road in the town of Sullivan:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) heavy silt loam crushed, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure parting to weak fine granular; friable; many fine and few medium roots; slightly acid; abrupt smooth boundary.

B21gt—7 to 19 inches; dark reddish gray (5YR 4/2) heavy silty clay loam; many (35 percent) medium and fine distinct brown (7.5YR 4/4) mottles in interiors of peds and few fine faint dark gray (5YR 4/1) mottles; moderate coarse prismatic structure parting to moderate medium angular blocky; firm, sticky and plastic; few fine roots; common fine pores; gray (5YR 5/1) prism faces; discontinuous thick clay films on faces of peds and continuous clay linings in pores; neutral; gradual smooth boundary.

B22gt—19 to 27 inches; reddish gray (5YR 5/2) silty clay; many (45 percent) medium distinct reddish brown (5YR 4/4) mottles in interiors of peds and few fine distinct brown (7.5YR 5/4) and dark gray (5YR 4/1) mottles; strong very coarse prismatic structure parting to moderate coarse angular blocky; firm, very sticky and very plastic; faces of peds are gray (5YR 5/1); common fine pores; continuous clay films on faces of peds and lining pores; neutral; clear smooth boundary.

B23gt—27 to 35 inches; reddish gray (5YR 5/2) silty clay loam; many (40 percent) coarse distinct dark brown (7.5YR 4/4) mottles and few fine distinct light gray (10YR 6/1) threadlike mottles; moderate coarse angular blocky structure; firm, sticky and plastic; gray (N 5/0) faces of peds; patchy thick clay films on primary faces of peds and continuous thick clay coatings in pores; neutral; clear smooth boundary.

Cg—35 to 62 inches; variegated reddish brown (5YR 4/3), gray (N 5/0), and brown (7.5YR 5/2) silty clay loam that has varves of silt; silt content increases with increasing depth; moderate thin and medium platy structure; firm and slightly sticky; few fine pores; common pinkish gray (5YR 6/2) lime coats on faces of plates; strongly calcareous; moderately alkaline.

The thickness of the solum and the depth to carbonates range from 26 to 40 inches. Depth to bedrock is more than 5 feet. Coarse fragments generally are absent, but a few pebbles are in some pedons. Reaction is slightly acid or neutral in the solum.

Some areas have an A1 horizon. The A1 or Ap horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. Structure is subangular blocky or granular.

The Bgt horizon is clay, silty clay, or silty clay loam. The matrix has hue mainly of 2.5YR or 5YR, value of 4 or 5, and chroma of 0 to 2 near the outside of peds. Ped interiors mainly have chroma of 3 or 4. Mottles are few to many and have high and low chroma. Structure is moderate to strong prismatic or blocky, or both. Consistence is sticky or very sticky and plastic or very plastic. Some profiles have a B3g horizon.

The C horizon is variable color but generally has hue of 5YR. It ranges from silty clay to clay and typically is varved with silt.

Lakemont soils are in a drainage sequence with the moderately well drained and well drained Schoharie soils and the somewhat poorly drained Odessa soils. They commonly are near the silty Canandaigua soils. They have drainage similar to that of Canandaigua soils but have a higher content of clay in the subsoil than those soils.

Lk—Lakemont silt loam. This soil is nearly level and formed in glacial lake deposits that are mostly clay and silt. It is in low areas. Slope is 0 to 3 percent. In most areas this soil is poorly drained, and in a few areas it is very poorly drained.

Included with this soil in mapping are small areas of somewhat poorly drained Odessa soils that are higher on the landscape than this soil. Also included are a few small spots of Fonda soils in deep depressions. In a few areas near Oneida Lake, a soil that is similar to this Lakemont soil but is moderately deep to contrasting coarser textured deposits is also included.

This soil is suited to water-tolerant pasture grasses and trees. If drained, it is suited to cultivated crops and hay. Effective drainage systems are difficult to install: there is a lack of suitable outlets, and the drains need to be closely spaced because of very slow permeability in the fine textured subsoil. Bedding can be used to improve surface drainage and is especially beneficial to pasture. Use of cover crops, return of crop residue to the soil, and plow-

ing at the proper moisture content are practices that help to maintain good soil tilth and reduce the hazard of clodding and crusting in cultivated areas.

Prolonged wetness, very slow permeability, and low strength are the principal limitations to the use of this soil for most nonfarm purposes. Some areas of this soil have potential as sites for ponds or for development of wetland wildlife habitat. Capability subclass IVw.

Lamson series

The Lamson series consists of deep, poorly drained and very poorly drained soils. These soils formed in glaciolacustrine (lake-laid) deposits that are mainly fine sand and very fine sand. They are nearly level and are mostly in low areas and depressions on the lake plain.

In a representative profile the surface layer is very dark grayish brown very fine sandy loam 9 inches thick. The subsurface layer is friable, mottled, light brownish gray fine sandy loam 6 inches thick. The subsoil is friable and mottled and is 17 inches thick. It is grayish brown, strong brown, and brown fine sandy loam and brown very fine sandy loam. The substratum, to a depth of 62 inches, is friable, brown very fine sandy loam and very friable, grayish brown loamy fine sand.

The water table is at or near the surface for long periods in spring. Depth to the water table generally corresponds to the level of ground water. Permeability is moderate to moderately rapid throughout the soil. Rooting depth is mostly confined to the surface layer in undrained areas. In drained areas, roots extend more deeply and available water capacity is moderate to high. The total content of nitrogen is high, but nitrogen is released slowly to plants when the soils are wet and cold. The natural supply of phosphorus is very low, and content of potassium is low. The natural content of lime is medium to high.

In undrained areas these soils are in native woodland and unimproved pasture. Some areas are drained and are in cultivated cropland or improved pastureland. Prolonged wetness is the main limitation to nonfarm uses of these soils.

Representative profile of Lamson very fine sandy loam, in a reforested area 80 feet north of Tyler Road and 0.3 mile west of Fly Road in the town of Sullivan:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) very fine sandy loam; few medium distinct brown (7.5YR 4/4) mottles in lower part; moderate fine granular structure; very friable; many fine and common medium and large roots; slightly acid; abrupt smooth boundary.

A2g—9 to 15 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct strong brown (7.5YR 5/6) and faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable; many fine and few medium roots; common fine pores; gray (10YR 6/1) exteriors of peds; slightly acid; clear smooth boundary.

B21g—15 to 24 inches; 50 percent grayish brown (10YR 5/2) and 50 percent strong brown (7.5YR 5/6) and brown (7.5YR 4/4) fine sandy loam; few fine distinct olive (5Y 5/3) mottles; very weak very coarse prismatic structure parting to weak medium subangular blocky; friable; common fine pores; common nodules or lenses less than 1/2 inch thick of reddish gray (5YR 5/2) sandy clay loam with clay bridging; neutral; gradual wavy boundary.

B22g—24 to 32 inches; brown (7.5YR 5/2) very fine sandy loam; common medium distinct strong brown (7.5YR 5/6), brown (10YR 5/3), and pinkish gray (5YR 6/2) mottles; weak medium subangular blocky structure; friable; few fine pores; neutral grading to mildly alkaline; gradual smooth boundary.

Clg—32 to 42 inches; brown (7.5YR 5/2) very fine sandy loam that has thin lenses of fine sandy loam; many fine and medium strong brown (7.5YR 5/6) and gray (10YR 6/1) mottles; weak thin platy structure; friable; few fine pores; mildly alkaline; gradual smooth boundary.

C2g—42 to 62 inches; grayish brown (10YR 5/2) loamy very fine sand that has thin strata of silt loam and fine sandy loam; common medium distinct brown (7.5YR 5/4) mottles; weak thin platy structure; very friable; few fine pores; strongly calcareous; moderately alkaline.

The solum is 30 to 40 inches thick. Carbonates commonly are in the C horizon. Depth to bedrock is more than 6 feet. Coarse fragments generally are absent but make up as much as 5 percent, by volume, of the soil material. Reaction is medium acid to neutral in the upper part of the solum and slightly acid to mildly alkaline in the lower part of the solum.

Some areas have an A1 horizon. The A1 or Ap horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2.

The A2g horizon is very fine sandy loam or fine sandy loam. Small lumps or nodules of sandy clay loam are common in some profiles. The A2g horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 1 or 2. Structure is weak medium or coarse subangular blocky or is absent.

The Bg horizon has texture similar to that of the A2g horizon. It has hue of 5YR to 10YR, value of 4 or 5, and chroma mainly of 1 or 2. In the upper part more than 40 percent of the material has chroma of 3 or higher. Mottles are common or many. Structure is prismatic or subangular blocky or both, or the material is massive. Consistence is very friable to firm.

The C horizon below a depth of 40 inches ranges from fine sand to silt loam and commonly is stratified. Color is variable. Structure is platy, or the material is massive or single grain. Consistence is friable to loose.

Lamson soils are in a drainage sequence with well drained Arkport soils, moderately well drained Galen soils, and somewhat poorly drained Minoa soils. Lamson soils formed in parent material similar to that in which those soils formed. They have drainage similar to that of sandy Wareham soils but are higher in clay content than Wareham soils.

Lm—Lamson very fine sandy loam. This soil is nearly level and formed in glacial lake deposits that are mainly fine sand and very fine sand. Slopes range from 0 to 3 percent but are mostly less than 2 percent. This soil commonly receives subsurface seepage from higher adjacent soils.

Included with this soil in mapping are a few large areas of soil that is similar to this Lamson soil but has more than 18 percent clay in the subsoil. Also included are a few small areas of soils that have calcareous material within 30 inches of the surface, some areas of soils that have a mucky surface layer, and a few small areas of soils that have clayey deposits within 40 inches of the surface.

If undrained, this soil is not suited to cultivated crops but is suited to water-tolerant pasture grasses and trees. If adequate drainage outlets are available, this soil has good response to subsurface tile drains. In some places special practices, for example, use of wrapped joints or filters, are needed to prevent sand from plugging the drains. If this soil is drained, it is well suited to vegetable crops and other crops commonly grown in the county and has excellent response to a high level of fertilization.

Prolonged wetness is the main limitation to most nonfarm uses of this soil. Sidewalls of excavations in water-saturated sand are unstable during installation of underground utilities. Some areas have potential for development of wetland wildlife habitat. Capability subclass IVw.

Lansing series

The Lansing series consists of deep, well drained soils that formed in glacial till derived from a mixture of sandstone, limestone, and shale. These soils are gently sloping to moderately steep and are on smooth, elongated hills and dissected valley sides on the upland plateau, mostly at an elevation of less than 1,600 feet.

In a representative profile the surface layer is dark grayish brown gravelly silt loam 6 inches thick. The subsurface layer is friable, yellowish brown gravelly silt loam 11 inches thick. The upper 11 inches of the subsoil is brown gravelly silt loam that has thin coatings of leached, pale brown light silt loam. The lower 14 inches of the subsoil is firm, dark brown gravelly heavy silt loam. The substratum, to a depth of 65 inches, is firm, brown very gravelly silt loam.

A seasonal high water table commonly is perched just above the slowly permeable substratum for very brief periods early in spring, especially in less sloping areas. Permeability is moderate in the surface layer and subsoil. Roots readily penetrate the substratum. Available water capacity is moderate to high. The natural supply of nitrogen is medium, content of phosphorus is low, and content of available potassium is medium to high. The natural content of lime is medium to low.

Many areas of these soils are used for crops associated with dairy farming. Some areas are used for pasture and trees. Slow permeability in the substratum is the main limitation to nonfarm uses that require good drainage.

Representative profile of Lansing gravelly silt loam, 8 to 15 percent slopes, in a reforested area 1/2 mile east of the village of Morrisville and 70 feet north of U.S. Route 20 in the town of Eaton:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly silt loam, rubbed; moderate medium and fine granular structure; friable; many fine and medium roots; 15 percent coarse fragments; slightly acid; abrupt smooth boundary.

A2—6 to 17 inches; yellowish brown (10YR 5/4) gravelly silt loam; weak fine and medium subangular blocky structure; friable; many fine and common medium roots; many fine pores, 10 percent brown (10YR 4/3) interiors of peds; few dark grayish brown (10YR 4/2) vertical wormcasts in upper part; 20 percent coarse fragments; medium acid; gradual irregular boundary.

B&A—17 to 28 inches; brown (10YR 4/3) gravelly silt loam; moderate medium subangular blocky structure; friable; common fine roots; thick clay linings in pores and along old root channels in interior of peds; pale brown (10YR 6/3) coatings of light silt loam, light gray (10YR 7/2) dry, 1 to 2 millimeters thick on faces of peds; 25 percent coarse fragments; slightly acid; gradual irregular boundary.

B2t—28 to 42 inches; dark brown (10YR 4/3) gravelly heavy silt loam; moderate medium subangular blocky structure; firm; few fine roots; common fine pores; continuous clay linings in pores; patchy moderately thick clay films on faces of peds; 30 percent coarse fragments; neutral; gradual wavy boundary.

C—42 to 65 inches; brown (10YR 5/3) very gravelly silt loam with some inherited dark grayish brown (10YR 4/2) patches; common fine faint brown (7.5YR 5/4) mottles; weak medium platy structure; firm grading to very firm in the lower part; few pores; 40 percent coarse fragments; strongly calcareous at a depth of 47 inches; moderately alkaline.

The thickness of the solum and the depth to carbonates range from 36 to 60 inches. Depth to bedrock is more than 5 feet. Coarse fragments are mixed limestone, shale, and sandstone. They make up 5 to 35 percent, by volume, of the solum and as much as 50 percent of the substratum. Reaction is strongly acid to slightly acid in the upper part of the solum and slightly acid or neutral in the lower part of the solum.

Some areas have an A1 horizon. The Ap or A1 horizon has hue mainly of 10YR, value of 3 to 5, and chroma of 2.

The A2 horizon is loam or silt loam, and gravelly analogues are common. It has hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

Instead of the moderately degraded B&A horizon, some profiles have a more strongly degraded A&B horizon. Consistence of the B&A horizon is friable or firm.

The B2t horizon ranges from loam to heavy silt loam, and subhorizons of light silty clay loam are in some places. The Bt horizon has hue mainly of 10YR, value of 4 or 5, and chroma of 3 or 4. Faint, high chroma mottles are in the lower part of the Bt horizon in some profiles. Clay content in the Bt horizon ranges from 18 to 28 percent. Structure is moderate or strong. Consistence is friable or firm.

The C horizon is very gravelly, gravelly, or channery loam or silt loam and is cobbly or stony in some places. Consistence is firm or very firm.

Lansing soils are in a drainage sequence with moderately well drained Conesus soils, somewhat poorly drained Appleton soils, and poorly drained and very poorly drained Lyons soils. They are near Honeoye soils and formed in glacial till similar to that in which Honeoye soils formed but have a thicker solum and are calcareous at a greater depth.

LsB—Lansing gravelly silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, except the surface layer and subsoil are slightly thicker and the lower part of the subsoil is mottled. Slopes commonly are uniform and convex, and in a few areas they are undulating. This soil receives little or no runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of somewhat poorly drained Appleton soils and poorly drained and very poorly drained Lyons soils along field drainageways and in depressions. Prominent areas of these included soils are indicated on the soil maps by the symbol for a field drainageway or a wet spot. Moderately well drained Conesus soils near the base of long slopes and in shallow depressions are also included.

This soil is well suited to row crops, pasture, and trees. It is used extensively for corn and deep-rooted legumes for forage. Under proper management good soil tilth is easy to maintain even in intensively cultivated areas. Runoff is medium, and the hazard of erosion is moderate. Stripcropping can be used in many areas because of the smooth, broad, oblong slopes. Coarse fragments hinder some tillage operations in places.

This soil has potential as homesites and for other nonfarm uses, but slow permeability in the substratum is a limitation. Septic effluent fields and drainage systems around basements should be designed to offset this limitation. Some areas of this soil have a scenic view. Capability subclass IIe.

LsC—Lansing gravelly silt loam, 8 to 15 percent slopes. This sloping soil has the profile described as representative of the series. Slopes are convex or smooth. This soil commonly receives runoff from higher adjacent soils, but runoff water is quicky removed.

Included with this soil in mapping are a few areas of moderately well drained Conesus soils and somewhat poorly drained Appleton soils in shallow depressions, in drainageways, and on broad foot slopes. Also included are a few areas of Aurora soils that are moderately deep to bedrock. A few areas of soils that have slopes of 15 to 20 percent are also included.

This soil is suited to cultivated crops, but in many areas it is better suited to hay and pasture crops or trees. A large acreage of this soil is used for long term hay or permanent pasture. The hazard of erosion is moderate to severe. Runoff is medium to rapid. Where areas of this soil are not strongly dissected, stripcropping, terracing, and other conservation measures can be used. Slope slightly hinders the operation of heavy equipment, and coarse fragments hinder some tillage operations.

Slope and slow permeability in the substratum are the principal limitations to nonfarm uses of this soil. Many areas have a scenic view, but homesites should be carefully selected. Capability subclass IIIe.

LsD—Lansing gravelly silt loam, 15 to 25 percent slopes. This soil has a profile similar to the one described as representative of the series, except the surface layer and subsoil are slightly thinner. Slopes are slightly convex or plane. This soil commonly receives a moderate amount of runoff from higher soils.

Included with this soil in mapping are a few areas of soils that have slopes of 25 to 30 percent. A few small areas of moderately well drained Conesus soils, which are mostly on footslopes, and a few small areas of Aurora soils, which are moderately deep to bedrock, are also included.

This soil is suited to hay and pasture crops and trees. If cultivated crops are grown, they should be grown only occasionally and a maximum of conservation practices should be used. The use of equipment is difficult because of slope, and coarse fragments hinder some tillage operations in places. In unprotected areas, the hazard of erosion is severe and runoff is rapid. Maintaining a thick cover of vegetation is the best means of protecting the soil.

Slope and slow permeability in the substratum are the main limitations to nonfarm uses. Near villages and other residential areas, this soil is suitable for use as open space corridors. Capability subclass IVe.

Lima series

The Lima series consists of deep, moderately well drained soils. These soils formed in glacial till derived from limestone, shale, and fine-grained sandstone. They are nearly level to sloping. They are in undulating areas of the upland plateau and at the base and top of broad drumlinlike hills.

In a representative profile the surface layer is very dark grayish brown silt loam 8 inches thick. The upper 5 inches of the subsoil is dark brown gravelly silt loam that has thin vertical coatings of leached brown loam. The lower 10 inches of the subsoil is firm, mottled, dark brown gravelly loam that grades to gravelly silt loam. The substratum, to a depth of 60 inches, is very firm, dark grayish brown gravelly silt loam and very gravelly heavy silt loam.

A temporary seasonal high water table commonly is perched above the slowly permeable substratum early in spring and in excessively wet periods. Permeability is moderate in the surface layer and subsoil. Rooting depth is mainly confined to the upper 24 inches, but some roots extend more deeply as the water table subsides late in spring. Available water capacity is moderate to high. The natural supply of nitrogen is medium, supply of phosphorus is low, and supply of available potassium is high. The natural content of lime is high.

Many areas of these soils are used intensively for row crops and hay crops associated with dairying. Some areas are used for pasture and trees. Temporary seasonal wetness and slow permeability in the substratum are limitations to most nonfarm uses of these soils.

Representative profile of Lima silt loam, 3 to 8 percent slopes, in a hayfield 300 yards of Mile Strip Road and 1/4 mile west of Bellinger Road in the town of Fenner:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) rubbed; moderate medium and fine granular structure; friable; many fine and medium roots; 12 percent coarse fragments; slightly acid; abrupt smooth boundary.

B&A—8 to 13 inches; dark brown (10YR 4/3) gravelly silt loam; weak medium and fine subangular blocky structure; friable; many fine roots; many fine pores; patchy clay linings in pores; brown (10YR 5/3) coatings of loam, light gray (10YR 7/2) dry, 1 to 2 millimeters thick on faces of peds; few darker worm channels and organic stains; 15 percent coarse fragments; slightly acid; gradual wavy boundary.

B21t—13 to 17 inches; dark brown (10YR 4/3) gravelly loam; common fine faint yellowish brown (10YR 5/4) mottles; moderate medium and fine subangular blocky structure; firm; common fine roots; common fine pores; thin clay linings in pores; patchy clay films on faces of some peds; 25 percent coarse fragments; neutral; gradual wavy boundary.

B22t—17 to 23 inches; dark brown (10YR 4/3) gravelly silt loam; common medium and fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous clay linings in pores; clay films on faces of peds; 30 percent coarse fragments; common very dark grayish brown (10YR 3/2) shale fragments; neutral; mildly alkaline at a depth of 20 inches; clear wavy boundary.

C1—23 to 41 inches; dark grayish brown (10YR 4/2) gravelly silt loam; common medium distinct yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) mottles; massive grading to weak thick platy structure; very firm; few fine roots in upper part; 30 percent coarse fragments; few large cobbles; strongly calcareous; moderately alkaline; clear wavy boundary.

IIC2—41 to 60 inches; dark grayish brown (10YR 4/2) very gravelly heavy silt loam; common medium distinct yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; massive; very firm; 45 percent coarse fragments; strongly calcareous; moderately alkaline.

The solum is 18 to 30 inches thick. The depth to carbonates ranges from slightly less than 18 inches to slightly less than 30 inches. Depth to bedrock is more than 4 feet. Coarse fragments are of mixed lithology. Dark shale is prominent in the lower part of the solum and substratum in some profiles. Coarse fragments make up 5 to 30 percent, by volume, of the solum and 30 to 50 percent of the substratum. Reaction is medium acid to neutral in the upper part of the solum and neutral to mildly alkaline in the lower part of the solum.

Some areas have an A1 horizon. The Ap or A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2.

In the B&A horizon, texture of the fine earth fraction is loam or silt loam. The A portion of the B&A horizon is slightly coarser textured than the B portion. Ped exteriors in the A portion have hue of 10YR or 7.5YR, value of 5 or 6, and chroma mainly of 3. Ped interiors in the B portion have hue of 5YR to 10YR, value mainly of 4, and chroma of 3 or 4. A thin A2 horizon is above the B&A horizon in some areas.

In the B2t horizon, texture of the fine earth fraction is loam or silt loam and gravelly analogues are common. Color is similar to that of the B portion of the B&A horizon. Mottles are common or many. Consistence is firm or friable.

The calcareous C horizon ranges from fine sandy loam to heavy silt loam and includes gravelly, very gravelly, and cobbly analogues. It has hue of 10YR to 5YR, value of 4 or 5, and chroma mostly of 2. Consistence is firm or very firm.

Lima soils are in a drainage sequence with well drained Honeoye soils, somewhat poorly drained Appleton soils, and poorly drained and very poorly drained Lyons soils. Lima soils are near Conesus soils, and they are similar to those soils but have a thinner solum and are calcareous closer to the surface.

LtA—Lima silt loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, except mottles are more distinct and are slightly closer to the surface. This soil receives little runoff from adjacent soils. However, it is mainly in the wetter half of the moderately well drained class because runoff is removed slowly.

Included with this soil in mapping are a few areas of somewhat poorly drained Appleton soils in shallow depressions and drainageways and poorly drained and very poorly drained Lyons soils in deeper depressions. Also included are more sloping phases of Lima soils and well drained Honeoye soils on small knolls. A few areas of nearly level Conesus soils are also included.

This soil is suited to cultivated crops, hay and pasture crops, and trees. Tillage is slightly delayed in spring because of temporary wetness. Randomly placed drains for the included wet spots can be used to remove excess water in many areas. This soil is easy to till at the proper moisture content, but stones hinder tillage operations in some places. If this soil is used intensively for row crops, management practices including return of crop residue to the soil, use of cover crops, and minimum tillage should be used to maintain good soil tilth.

Temporary seasonal wetness and the slow permeability in the substratum are the main limitations to nonfarm uses. If this soil is used as a homesite, special care should be taken in selecting the site and in designing drainage systems to offset these limitations. Capability subclass IIw.

LtB—Lima silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. Slopes are slightly convex. This soil commonly receives some runoff from higher adjacent soils. Moderately large, oblong areas of this soil are on the upper and lower slopes of smooth broad hills.

Included with this soil in mapping are small areas of somewhat poorly drained Appleton soils in shallow depressions and drainageways. Also included are a few small areas of well drained Honeoye soils on knolls that are slightly higher on the landscape than this Lima soil. In the west-central part of the county, a few large areas of a soil that has a surface layer and subsoil that are darker in color than this Lima soil are also included.

This soil is suited to cultivated crops, hay and pasture, and trees. Many areas are used for corn and small grains. Erosion is a hazard, especially on long slopes in cultivated areas. Cross slope tillage, use of cover crops, plowing at the proper moisture content, and minimum tillage reduce erosion and help to preserve good soil tilth. Artificial drainage is needed in some areas to remove excess water so that tillage is not excessively delayed in spring. Interceptor drains can be used to remove runoff, and randomly placed drains can be used to drain wet spots.

Temporary seasonal wetness, slow permeability in the substratum, and slope are the main limitations to the use of this soil for nonfarm purposes. If this soil is used as a homesite, artificial drainage may be required to offset soil limitations that adversely affect basements and septic effluent fields. Capability subclass IIe.

LtC—Lima silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, except the depth to the calcareous substratum is slightly less. Slopes are plane or slightly convex. This soil generally receives a moderate to large amount of runoff from higher adjacent soils.

Included with this soil in mapping are a few areas of somewhat poorly drained Appleton soils in drainageways and at the base of long slopes. A few small areas of severely eroded soils are also included.

This soil is suited to hay and pasture crops and trees. It is also suited to some cultivated crops, but the hazard of erosion is severe in unprotected areas. Practices that reduce soil and water losses can be used in many areas. These practices include contour tillage, use of grassed waterways, and stripcropping. A conservation cropping system should include deep-rooted sod crops; where contour farming is impractical because of complex slopes, the cropping system should consist only of small grains and hay. Interceptor drains can be used in many areas to divert and remove excess runoff.

The principal limitations to the use of this soil for most nonfarm purposes are slow permeability in the substratum, slope, and temporary seasonal wetness. Excessive scalping and grading to level areas may increase seasonal wetness and may decrease permeability. Capability subclass IIIe.

LuC—Lima very stony silt loam, sloping. This soil has a profile similar to the one described as representative of the series, except the depth to the calcareous substratum is less and large stones are on the surface.

Stones and a few boulders cover as much as 3 percent of the land surface and are about 5 to 30 feet apart. Slopes range from 5 to 15 percent.

Included with this soil in mapping are some small areas of well drained Honeoye soils that are very stony. Also included are a few small areas of soils that have slopes of as much as 30 percent. Somewhat poorly drained Appleton soils and very poorly drained and poorly drained Lyons soils are included in seep spots, slight depressions, and drainageways. A few areas of soils that have a surface layer of loam and gravelly silt loam are also included.

This soil is suited to pasture and trees. Large stones must be removed from the surface before this soil can be tilled with modern equipment. Erosion is a hazard in overgrazed or unprotected areas. Because of the difficulty in applying fertilizer and lime and in reseeding, pasture commonly is poor in quality. Randomly placed drains for wet spots and interceptor drains are needed in many cleared areas to prevent excessive delay of tillage in spring.

Stoniness, slow permeability in the substratum, and slope are the major limitations to nonfarm uses. Many areas have scenic value and have potential for some recreational purposes, for example, picnicking and hiking. Capability subclass VIs.

Lockport series

The Lockport series consists of moderately deep, somewhat poorly drained soils. These soils formed in a thin mantle of reddish glacial till that contains residuum from the underlying soft shale bedrock. In some areas lacustrine sediment is mixed with the till. These soils are nearly level and gently sloping and are on the lake plain and in areas bordering the lake plain and the upland plateau.

In a representative profile the surface layer is dark brown heavy silt loam 5 inches thick. Below this is a subsurface layer of leached, mottled, reddish brown silty clay loam 3 inches thick. The subsoil is firm, mottled, weak red silty clay 16 inches thick. Weak red, soft shale is at a depth of 24 inches.

A seasonal high water table is in the upper part of the subsoil in spring and in other excessively wet periods. It commonly is perched above the nearly impervious, clay-rich, shale bedrock or substratum. Soft shale bedrock is at a depth of 20 to 40 inches. Permeability is moderate in the surface layer and very slow in the subsoil. Rooting depth is mainly confined to the upper part of the subsoil, but a few roots extend more deeply where the soil mantle is about 40 inches thick and when the water table recedes late in spring. Available water capacity is moderate to low. The fine textured subsoil is a poor medium for root development, and tilth is poor where subsoil material is incorporated into the surface layer. The natural supply of nitrogen is medium to high, content of phosphorus is low to medium, and content of available potassium is high. The natural content of lime is medium.

Most areas of these soils are used for pasture and trees or are idle. A few areas are used for cultivated crops. Moderate depth to bedrock, seasonal wetness, and very slow permeability are limitations to many nonfarm uses of these soils.

Representative profile of Lockport silt loam, 0 to 3 percent slopes, in an idle field 50 feet north of Tag Road and 0.4 mile west of Gee Road in the town of Sullivan:

Ap—0 to 5 inches; dark brown (7.5YR 4/2) heavy silt loam; moderate fine subangular blocky structure; friable; many fine and few common roots; few dark brown (7.5YR 3/2) vertical wormcasts; 2 percent coarse fragments; medium acid; clear smooth boundary.

A2—5 to 8 inches; reddish brown (5YR 5/3) silty clay loam; many medium distinct yellowish red (5YR 5/6) and few faint weak red (2.5YR 5/2) mottles; weak medium subangular blocky structure; firm and slightly plastic; many fine roots; few dark brown (7.5YR 4/2) vertical wormcasts; few fine pores; thin patchy clay linings in pores in interior of peds; faces of peds are brown (7.5YR 4/2); 2 percent coarse fragments; slightly acid; clear wavy boundary.

B2t—8 to 24 inches; weak red (10R 4/4) silty clay; many medium prominent yellowish red (5YR 5/8) and common fine prominent light gray (5YR 7/1) threadlike mottles; moderate very coarse prismatic structure parting to moderate coarse blocky; firm and plastic; few fine roots on faces of peds in upper part; weak red (2.5YR 5/2) thick clay films on faces of peds and lining pores; thin brown (7.5YR 4/2) silty coatings interfingering faces of peds in upper 3 inches; 3 percent coarse fragments, many partially disintegrated shale fragments in lower part; slightly acid; gradual wavy boundary.

R—24 inches; weak red (10R 4/3) soft shale increasing in hardness with increasing depth; neutral.

The solum is 20 to 30 inches thick, and depth to bedrock is 20 to 40 inches. Coarse fragments are mainly red soft shale, but some profiles have limestone and sandstone. Content of coarse fragments ranges from a few to 35 percent in the solum and generally increases with increasing depth. Reaction in the solum ranges from medium acid to mildly alkaline.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma mainly of 2. Structure is granular or subangular blocky.

The A2 horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma mainly of 3. Texture of the fine earth fraction is clay loam or silty clay loam. Mottles are common to many. Consistence is friable or firm.

The B horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 3 or 4. Ped exteriors have chroma of 2 or lower. Texture ranges from heavy silty clay loam or clay loam to clay, and shaly or gravelly analogues are in some places. High and low chroma mottles are common or many. Material from the A2 horizon interfingers the upper part of the B horizon.

Some areas have a C horizon. The C horizon, where present, has color similar to that of the B horizon. Texture is slightly coarser and coarse fragment content is greater than in the B horizon. Reaction is neutral or mildly alkaline.

The R horizon, or bedrock, is mainly neutral or mildly alkaline soft shale but is hard limestone in a few areas.

The Lockport soils are in a drainage sequence with the moderately well drained and well drained Lairdsville soils. They are near Odessa soils and have texture similar to that of Odessa soils but are moderately deep to bedrock.

LvA—Lockport silt loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. Because runoff is removed slowly and infiltration is slow, this soil is mostly in the wetter half of the somewhat poorly drained class.

Included with this soil in mapping are a few small areas of soils that are similar to this Lockport soil but are poorly drained, mostly in slight depressions and along

shallow drainageways. A few small areas of soils that have a surface layer of light silty clay loam and a few areas of soils that have olive colors rather than reddish colors are also included.

This soil is suited to hay and pasture plants and trees that can tolerate seasonal wetness. If undrained, this soil generally is not well suited to cultivated crops. Drainage is difficult to install because of moderate depth to bedrock. Also, because permeability is very slow in the subsoil, drains must be closely spaced to be effective. Use of cover crops, return of crop residue to the soil and including a high proportion of sod crops in the cropping system are important practices that maintain good soil tilth and reduce the hazard of surface crusting and clodding in cultivated areas. Bedding improves surface drainage in pastureland.

Depth to bedrock, seasonal wetness, very slow permeability, and fine texture in the subsoil are limitations to the use of this soil for many nonfarm purposes. Some areas have potential for development of habitat for wetland wildlife. Capability subclass IIIw.

LvB—Lockport silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, except mottles are fewer and less distinct in the subsurface layer. Slopes are mostly simple, plane, and uniform. On this soil, runoff is more rapid and more runoff is received from higher adjacent soils than on the nearly level Lockport soil.

Included with this soil in mapping are a few small areas of soils that are similar to this Lockport soil but are poorly drained; these included soils are in slight depressions. Also included are moderately well drained and well drained Lairdsville soils on slightly elevated, convex rises. A few large areas of soils that have a surface layer of silty clay loam and a few small areas of soils that have olive colors are also included.

This soil is suited to hay and pasture crops and trees. Varieties that can tolerate seasonal wetness grow best. Seasonal wetness and the hazard of erosion somewhat restrict the use of this soil for cultivated crops. Interceptor drains are more effective in improving drainage on this soil than on the nearly level Lockport soil. Because water infiltration is slow, the hazard of erosion is moderate. Management practices that include use of cover crops, cross slope tillage, plowing at the proper moisture content, and using sod crops in the cropping system reduce erosion and surface crusting and clodding.

Moderate depth to bedrock, very slow permeability in the subsoil, seasonal wetness, and slope are limitations to the use of this soil for many nonfarm purposes. Some areas have potential for development of wildlife habitat. Capability subclass IIIw.

Lordstown series

The Lordstown series consists of moderately deep, well drained soils. These soils formed in a thin mantle of glacial till that commonly is mixed with frost-fractured material derived from the underlying sandstone, siltstone, or shale bedrock . These soils are gently sloping to very steep and are on the dissected upland plateau.

In a representative profile the surface layer is dark grayish brown channery silt loam 4 inches thick. The subsoil is very friable, yellowish brown and brown channery silt loam 24 inches thick. Very dark gray and dark gray interbedded sandstone and shale is at a depth of 28 inches.

A seasonal high water table generally does not occur in the soil mantle. However, in some areas where the bedrock is not fractured and jointed, mottles are just above the bedrock, indicating that brief periods of saturation do occur. Permeability in the soil is moderate. Rooting depth is confined to the 20- to 40-inch thick zone above the bedrock. Available water capacity is low to moderate depending on soil depth and the content of coarse fragments. The natural content of nitrogen is medium. The natural supply of phosphorus is low, and content of potassium is medium. The natural content of lime is low.

Many areas of these soils are used for cultivated crops and hay and pasture. Some areas, especially the more sloping areas, are reforested or are idle. Moderate depth to bedrock is the main limitation to nonfarm uses of these soils.

Representative profile of Lordstown channery silt loam, 8 to 15 percent slopes, in a pine plantation 100 feet north of an unnamed unimproved State road and 1 mile south of Brown Road in the town of Brookfield:

A1—0 to 4 inches; dark grayish brown (10YR 4/2) channery silt loam; moderate fine granular structure; friable; many fine and medium and few coarse roots; a thin light gray (10YR 7/2) discontinuous A2 horizon 1/8 inch thick is in the lower part; 15 percent coarse fragments; strongly acid; clear wavy boundary.

B21—4 to 19 inches; yellowish brown (10YR 5/4) channery silt loam; weak fine subangular blocky structure; very friable; many fine and medium roots; many fine pores; 15 percent coarse fragments; strongly acid; clear wavy boundary.

B22—19 to 28 inches; brown (10YR 5/3) channery silt loam; weak fine subangular blocky structure; very friable; common fine and few medium roots; many fine pores; 25 percent coarse fragments; strongly acid; abrupt smooth boundary.

R—28 inches; very dark gray (10YR 3/2) and dark gray (10YR 4/1) interbedded fine grain sandstone and shale; jointed.

The solum is 20 to 36 inches thick, and depth to bedrock is 20 to 40 inches. Coarse fragments are mainly thin and flat and generally are derived from the underlying bedrock. They make up 15 to 35 percent, by volume, of the solum and as much as 60 percent of the substratum, where it is present. Reaction is very strongly acid or strongly acid in unlimed areas.

Some areas have an Ap horizon. The Ap or A1 horizon has hue of 10YR, value of 3 or 4, and chroma mainly of 2. Structure is weak or moderate granular. Consistence is very friable or friable.

The B horizon is channery loam or channery silt loam. It has hue of 10YR or 2.5YR, value mainly of 5, and chroma of 3 to 6. Consistence is friable or very friable.

Some areas have a C horizon. The C horizon, where present, has texture similar to that of the B horizon, except very channery or flaggy analogues are common. It has hue and value similar to those of the B horizon; however, chroma is mostly 2 or 3, and high chroma mottles are in some profiles. Structure is platy, or the material is massive. Consistence is friable or firm.

The R horizon, or bedrock, is thick- to thin-bedded, hard, acid sandstone or siltstone that commonly is interbedded with shale (fig. 9).

Lordstown soils are near the somewhat poorly drained and poorly drained Tuller soils and formed in parent material similar to that in which those soils formed. They are similar to and commonly are near Arnot soils but are slightly deeper to bedrock and have fewer coarse fragments than those soils.

LwB—Lordstown channery silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, except it commonly has a mottled substratum. This soil is on slightly convex hilltops and on benches along hillsides and the upper part of valley walls. This soil receives little or no runoff from adjacent soils.

Included with this soil in mapping are a few areas of shallow Arnot soils. Also included are shallow, somewhat poorly drained and poorly drained Tuller soils and deep, somewhat poorly drained Volusia soils in a few slight depressions and drainageways. A few areas of Bath and Mardin soils, which are more than 40 inches deep to bedrock, are also included.

This soil is suited to some cultivated crops, hay and pasture crops, and trees. The selection of row crops that can be grown is slightly limited by the somewhat short growing season associated with high elevation and by droughtiness where the soil depth is less than 25 inches. Water penetrates the soil readily. The hazard of erosion is slight. Soil and water conservation measures that include cross slope tillage, use of cover crops, and minimum tillage can be applied in most areas. In some places bedrock hinders construction of drainage systems for the included wet spots. Coarse fragments slightly hinder some tillage operations.

Bedrock at a depth of 20 to 40 inches is a limitation to the use of this soil for many nonfarm purposes. Many areas have potential for recreational activities, for example, hiking, camping, and picnicking. Capability subclass IIe.

LwC—Lordstown channery silt loam, 8 to 15 percent slopes. This sloping soil has the profile described as representative of the series. It is on slightly convex valley sides and side slopes of rounded hills. Some areas have a stairstep appearance because of the shelflike, horizontally oriented bedrock.

Included with this soil in mapping are a few areas of shallow, well drained and moderately well drained Arnot soils. Also included are a few very small areas of rock outcrops. A few small areas of somewhat poorly drained and poorly drained Tuller soils in drainageways and on foot slopes are also included.

This soil is suited to some cultivated crops, hay and pasture crops, and trees. The somewhat short growing season associated with high elevation and droughtiness in midsummer limit the choice of crops. The hazard of erosion is moderate. Soil and water conservation practices that include cross slope tillage, use of cover crops, and stripcropping are needed to protect the relatively thin soil mantle. Applying these practices is difficult, however, where bedrock crops out or the landscape has a stairstep appearance. Tillage is somewhat difficult in places because of coarse fragments and slope.

Moderate depth to bedrock, slope, and the presence of coarse fragments are limitations to the use of this soil for many nonfarm purposes, for example, residential development. Capability unit IIIe.

LwD—Lordstown channery silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, except depth to bedrock is slightly less because of soil loss from erosion. This soil is on valley sides and on short slopes of upland hillsides. It generally receives runoff from higher adjacent soils.

Included with this soil in mapping are some fairly large areas of shallow Arnot soils. Also included are a few areas of ledged bedrock outcrops, mostly where the landscape has a stairstep appearance. These areas are identified on the soil maps by the symbol for a bedrock outcrop. A few small seep spots and springs and some areas of severely eroded soils are also included.

This soil generally is better suited to pasture and trees than to cultivated crops. If it is used for cultivated crops, however, moderately steep slopes, droughtiness in midsummer, a somewhat short growing season, and the presence of coarse fragments and the included outcrops are limitations. Most areas of this soil that previously were cleared and used for crops are now idle or have been reforested. Erosion is a severe hazard in cultivated areas, and a maximum of conservation practices are needed to control it.

Slope and moderate depth to bedrock are the principal limitations to the use of this soil for nonfarm purposes. Some areas have potential for some recreational developments, for example, ski slopes. In places where the underlying bedrock is suitable, this soil has potential as sites for shale quarries. Capability subclass IVe.

LXE—Lordstown-Arnot complex, steep. This map unit consists of about 50 percent Lordstown soil and 35 percent Arnot soil. These soils form such an intricate pattern on the landscape that it was not practical to map them separately at the scale used. The surface layer is mostly channery silt loam but is flaggy silt loam in some areas of the Arnot soil. These soils have a profile similar to the one described as representative of their series, except the surface layer and subsoil are thinner. Slopes range from 25 to 60 percent. These soils are mainly on valley sides, and the landscape in some areas has a stairstep appearance.

Included with these soils in mapping are a few areas of ledged rock outcrops. Also included are a few areas of soils that are less than 10 inches deep to bedrock. A few small areas of wetter soils and springs on toeslopes and a few spots of severely eroded soils are also included.

The soils in this map unit are not suited to cultivated crops or hay. Most areas are best suited to trees or to a brushy cover for wildlife. Pasture generally is poor in quality because of droughtiness and the difficulty in

reseeding and in applying fertilizer. The hazard of erosion is severe if the plant cover is removed.

Slope and depth to bedrock are severe limitations to most nonfarm uses of these soils. Some areas have potential for recreational developments, for example, ski slopes, or as sites for shale quarries. Capability subclass VIIs.

Lyons series

The Lyons series consists of deep, very poorly drained and poorly drained soils. These soils formed in glacial till deposits that commonly have a mantle of local colluvium. They are nearly level and are in depressions on the upland plateau and in low, islandlike areas on the lake plain.

In a representative profile the surface layer is very dark gray silt loam 10 inches thick. The upper part of the subsoil is friable, mottled grayish brown heavy silt loam 9 inches thick; the middle part is firm, dark gray, light silty clay loam 6 inches thick that has many mottles; and the lower part is firm, mottled, dark gray gravelly silt loam 9 inches thick. The substratum, to a depth of 62 inches, is firm, brown gravelly heavy loam.

The water table is at or near the surface for long periods during the year. Depth to the water table corresponds to the natural level of ground water in places, but the water table more commonly is perched above the slowly permeable or very slowly permeable substratum. Permeability is moderate in the surface layer and moderate or moderately slow in the subsoil. Most roots are confined to the surface layer in undrained areas. In drained areas roots extend more deeply and available water capacity is moderate to high. The total natural content of nitrogen is high, but nitrogen is released slowly to plants when the soils are damp and cold. The natural supply of phosphorus is low and content of available potassium is high. The natural content of lime is high.

Most areas of these soils are used for trees and permanent pasture. A few areas are drained and are used for cultivated crops or hay. Prolonged wetness is the main limitation to nonfarm uses of these soils.

Representative profile of Lyons silt loam, in an abandoned pasture 60 feet north of U.S. Route 20 and 200 feet northwest of Nelson Heights Road in the town of Nelson:

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; few fine distinct dark yellowish brown (10YR 4/4) mottles in lower part; moderate fine granular structure; friable; many fine and medium roots; 5 percent coarse fragments; neutral; abrupt smooth boundary.

B21g—10 to 19 inches; grayish brown (2.5Y 5/2) heavy silt loam; common fine distinct yellowish brown (10YR 5/4) and strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; few fine roots in upper part; common fine pores; 5 percent coarse fragments; neutral; clear smooth boundary.

B22g—19 to 25 inches; dark gray (10YR 4/1) light silty clay loam; many medium distinct strong brown (7.5YR 5/6), light yellowish brown (2.5Y 6/4), and grayish brown (10YR 5/2) mottles; weak very coarse prismatic structure parting to weak coarse subangular blocky; firm and slightly sticky; few fine pores; thin patchy clay linings in pores; 10 percent coarse fragments; neutral; clear smooth boundary.

B3g—25 to 34 inches; dark gray (10YR 4/1) gravelly silt loam; common medium distinct very dark gray (10YR 3/1) and brown (7.5YR 4/4) mottles and few fine faint dark grayish brown (2.5Y 4/2) mottles; weak coarse subangular blocky structure grading to platy firm and slightly sticky; few fine pores; 15 percent coarse fragments; mildly alkaline; gradual wavy boundary.

C—34 to 62 inches; brown (7.5YR 4/2) gravelly heavy loam; few fine faint dark yellowish brown (10YR 4/4) mottles; moderate thick platy structure; firm and slightly sticky; 25 percent coarse fragments, the percentage increasing with increasing depth; strongly calcareous; moderately alkaline.

The thickness of the solum and the depth to carbonates range from 22 to 40 inches. Depth to bedrock is more than 5 feet. Coarse fragments are dominantly limestone and shale. The content of coarse fragments ranges from 5 to 30 percent, by volume, in the subsoil and increases with depth to as much as 60 percent in the lower part of the substratum. Reaction in the solum is medium acid to mildly alkaline.

Some areas have an A1 horizon. Coarse fragments are few or absent in the A1 or Ap horizon. The A1 or Ap horizon has hue of 10YR or is neutral, and it has value of 2 or 3 and chroma of 0 to 2. Consistence is friable or very friable.

The B horizon ranges from silt loam to light clay loam, and thin subhorizons of fine sandy loam are in some places. Gravelly analogues are common. Hue is 2.5Y to 5YR, value is 4 to 6, and chroma is 2 or lower. High chroma mottles are few to many. Structure is weak or moderate subangular blocky or prismatic, or both. Consistence is friable or firm.

The C horizon ranges from fine sandy loam to silt loam and includes gravelly and very gravelly analogues. Hue is 2.5Y to 5YR, value is 4 or 5, and chroma is 1 or 2.

Lyons soils form a drainage sequence with the well drained Honeoye soils, the moderately well drained Lima soils, and the somewhat poorly drained Appleton soils. They are similar to the very poorly drained Alden soils but are calcareous within 40 inches of the surface.

Ly—Lyons silt loam. This soil is nearly level and formed in firm glacial till that commonly is mantled or mixed with silty colluvium. In upland areas, this soil is in concave depressions and receives a moderate to large amount of runoff from higher soils. Individual areas in the uplands are small in extent and commonly are narrow, and areas on the lake plain are moderate to large in extent. Slopes range from 0 to 3 percent but are mostly less than 2 percent.

Included with this soil in mapping are a few small areas of stony and very stony soils that are indicated on the soil maps by the symbol for a stony spot. Also included are a few small areas of soils that are less than 40 inches deep to bedrock and a few areas of soils that have a mucky surface layer. In a few seep areas, soils that have slopes of as much as 6 percent are also included.

This soil is not suited to cultivated crops or hay unless it is drained. Suitable outlets commonly are not available. Where they are available, however, surface and subsurface drains can be installed. In many areas this soil responds well to interceptor drains that divert runoff and subsurface seepage from adjacent higher soils. Minimum tillage, plowing at the proper moisture content, return of crop residue to the soil and use of cover crops are practices that help to maintain good soil tilth in intensively cultivated areas. Pasture generally is poor in quality and is difficult to improve in undrained areas.

The prolonged high water table near the surface and slow permeability or very slow permeability in the substratum are major limitations to the use of this soil for

nonfarm purposes. Many areas have potential as pond sites or for development of wetland wildlife habitat. Capability subclass IVw.

Mardin series

The Mardin series consists of deep, moderately well drained soils that have a fragipan. These soils formed in glacial till derived from sandstone, shale, and siltstone. They are gently sloping to moderately steep and are on the dissected upland plateau at the higher elevations in the county.

In a representative profile the surface layer is very dark grayish brown channery silt loam 8 inches thick. The upper part of the subsoil is friable, dark yellowish brown channery silt loam 6 inches thick. Below that is a leached layer of mottled, pale brown channery silt loam 2 inches thick. The lower part of the subsoil is a very firm fragipan of mottled, brown channery loam 26 inches thick. The substratum, to a depth of 60 inches, is firm, grayish brown very channery loam.

A temporary seasonal high water table is perched above the slowly permeable or very slowly permeable fragipan and substratum in spring and in other excessively wet periods. Permeability is moderate in the surface layer and upper part of the subsoil. Roots are mostly confined to the zone above the dense fragipan. Available water capacity in this zone is low to moderate. The natural supply of nitrogen is medium, content of phosphorus is low, and the supply of available potassium is medium to low. The natural content of lime is low.

Many areas of these soils are used for hay and pasture crops and trees. Some areas are idle. Some less sloping areas are used for cultivated crops. Slow or very slow permeability in the fragipan and temporary seasonal wetness are the main limitations to some nonfarm uses of these soils.

Representative profile of Mardin channery silt loam, 3 to 8 percent slopes, in a brushy field 130 yards south of Horton Road and 3/4 mile east of State Route 12B in the town of Hamilton:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) channery silt loam, dark grayish brown (10YR 4/2) rubbed; moderate fine granular structure; friable; many fine roots; 15 percent coarse fragments; slightly acid (limed); abrupt smooth boundary.

B2—8 to 14 inches; dark yellowish brown (10YR 4/4) channery silt loam; weak fine and medium subangular blocky structure; friable; many fine roots; many fine pores; 20 percent coarse fragments; medium acid; clear smooth boundary.

A'2—14 to 16 inches; pale brown (10YR 6/3) channery silt loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium and fine subangular blocky structure; friable; many fine roots; many fine pores; common skeletons on faces of peds; 25 percent coarse fragments; medium acid; clear wavy boundary.

B'x—16 to 42 inches; brown (10YR 5/3) channery loam; common medium distinct strong brown (7.5YR 5/6) and dark brown (7.5YR 4/2) mottles; weak very coarse prismatic structure parting to weak coarse subangular blocky; prisms are 12 inches in diameter; very firm and brittle; few fine roots along faces of prisms; few fine pores; thin patchy clay films in pores and on pebbles in lower part; light brownish gray (10YR 6/2) streaks 1/4- to 3/4-inch wide along faces of prisms, streaks have strong brown (7.5YR 5/8) borders; 30 percent coarse fragments; slightly acid; diffuse wavy boundary.

C—42 to 60 inches; grayish brown (10YR 5/2) very channery loam; many medium distinct strong brown (7.5YR 5/6) and dark brown (7.5YR 4/2) mottles and common coarse faint light gray (10YR 6/1) mottles; massive; firm; common fine pores; thin patchy clay films in pores and moderately thick patchy clay films on pebbles; 35 percent coarse fragments; neutral.

The solum is 40 to 60 inches thick, and depth to the top of the fragipan is 14 to 25 inches. Depth to bedrock is more than 5 feet. Coarse fragments are mainly flat and angular. They make up 15 to 35 percent, by volume, of the upper part of the solum and 20 to 60 percent of the lower part of the solum and the substratum. Reaction is very strongly acid to slightly acid in the solum and strongly acid to moderately alkaline in the substratum.

Some areas have an A1 horizon. The Ap or A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The B2 horizon is loam or silt loam and their channery or gravelly analogues. Hue is 7.5YR or 10YR, value is 4 or 5, and chroma is 3 to 5. Faint mottles are in the lower part in some profiles. Structure is weak or moderate subangular blocky or granular. Consistence is friable or very friable.

The A'2 horizon generally is 5 inches thick or less. It is channery or gravelly silt loam or loam. It has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 3. High chroma mottles are present in many profiles. Some areas do not have an A'2 horizon.

The Bx horizon is channery or very channery loam or silt loam. It has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. Structure is weak or moderate prismatic, and within the prisms it is subangular blocky or the material is massive. Consistence is firm or very firm and is brittle.

The C horizon has color and texture similar to those of the Bx horizon. Structure is weak platy, or the material is massive.

Mardin soils form a drainage sequence with somewhat poorly drained Volusia soils, poorly drained Chippewa soils, and well drained Bath soils.

MaB—Mardin channery silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It is on slightly convex hilltops and smooth hillsides. This soil receives little runoff from higher adjacent soils.

Included with this soil in mapping are small areas of somewhat poorly drained Volusia soils in slight depressions and along drainageways. Also included are small areas of poorly drained Chippewa soils that are indicated on the soil maps by the symbol for a wet spot. A few small areas of soils that are less than 40 inches deep to bedrock are also included.

This soil is suited to some cultivated crops, hay and pasture, and trees. Because of relatively high elevation and temporary wetness in spring, the growing season is somewhat shorter than in other areas of the county. As a result, adapted varieties of field crops should be selected. The use of randomly placed drains for wet spots allows tillage of many fields earlier in spring than is generally feasible. Erosion is a hazard in cultivated areas, especially on long slopes. Use of cover crops, contour tillage, and minimum tillage reduce erosion and improve soil tilth. Flat coarse fragments hinder tillage operations and cause excessive wear to machinery.

Slow or very slow permeability in the fragipan, temporary seasonal wetness, the presence of coarse fragments, and slope are limitations to the use of this soil for residential development and for other nonfarm purposes. Capability subclass IIw.

MaC—Mardin channery silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, except mottles are fewer and less distinct above the fragipan. Slopes are slightly convex or plane. They commonly are long and are dissected in many places by shallow drainageways. This soil generally receives runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of somewhat poorly drained Volusia soils along drainageways and at the base of long slopes. A few areas of soils that are less than 40 inches deep to bedrock and a few areas of severely eroded soils are also included.

This soil is suited to some cultivated crops, hay and pasture, and trees. Because runoff is rapid, the hazard of erosion is moderate to severe in cultivated areas that are not protected. Contour tillage, stripcropping, use of cover crops, and minimum tillage are practices that reduce erosion and help to conserve moisture in midsummer. Interceptor drains that divert runoff help to improve drainage in spring. Flat coarse fragments slightly hinder some precision tillage operations.

Slow or very slow permeability in the fragipan and substratum, temporary seasonal wetness, and slope are limitations to the use of this soil for some nonfarm purposes. Some areas are suitable for use as pond sites. Capability subclass IIIe.

MaD—Mardin channery silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, except the surface layer has more coarse fragments and mottles are fewer and less distinct above the fragipan. This soil is on the sides of long, narrow ridges and on valley sides that are dissected by narrow drainageways. It generally receives runoff from higher adjacent soils.

Included with this soil in mapping are small areas of somewhat poorly drained Volusia soils at the base of long slopes and in some drainageways. Also included are Lordstown soils in a few areas where bedrock is within a depth of 40 inches. A few areas of severely eroded soils and a few areas of poorly drained soils in seep spots and springs are also included.

This soil is suited to pasture, long term hay crops, and trees. Because of moderately steep slopes, the use of machinery is difficult and hazardous. Runoff is rapid, and the hazard of erosion is severe in unprotected areas. If cultivated crops are grown, they should be grown infrequently and a maximum of conservation practices should be used. These practices should include stripcropping on long slopes, contour tillage, and use of cover crops. Moisture lost through runoff limits crop growth in midsummer to a greater degree on this soil than on less sloping Mardin soils.

Slope, slow or very slow permeability in the fragipan, temporary seasonal wetness, and the presence of flat coarse fragments are limitations to most nonfarm uses. Some areas have potential for recreational developments, for example, ski slopes. Capability subclass IVe.

MDC—Mardin very stony silt loam, sloping. This soil has a profile similar to the one described as representative of the series, except large stones are on the surface and in the surface layer. Stones and a few boulders are about 5 to 30 feet apart on the surface. Slopes range from 5 to 15 percent.

Included with this soil in mapping are a few areas of soils that have slopes of 15 to 25 percent and a few areas of soils that have a surface layer of flaggy silt loam. Also included are a few areas of soils that do not have a large number of surface stones, a few small areas of soils that are less than 40 inches deep to bedrock, and a few areas of somewhat poorly drained Volusia soils.

This soil is suited to permanent pasture and trees. Because of large stones on the surface, tillage with modern equipment is not practical. Pasture generally is poor in quality because of droughtiness in midsummer and the difficulty in applying lime and fertilizer and in reseeding.

The presence of stones on the surface, slow or very slow permeability in the fragipan, temporary seasonal wetness, and slope are limitations to the use of this soil for most nonfarm purposes. Some areas have potential for development of wildlife habitat. Capability subclass VIs.

Martisco series

The Martisco series consists of deep, very poorly drained soils. These soils formed in well decomposed organic material less than 16 inches thick that overlies marl deposits. They are nearly level and are in low depressions on the lake plain.

In a representative profile the upper 10 inches is black muck (sapric material). The substratum extends to a depth of 84 inches. It is friable, mottled, light gray marl in the upper 8 inches and is friable gray marl below that.

The water table is at or near the surface throughout much of the year in undrained areas. Ponding or flooding is common in spring. Permeability is moderate or moderately rapid in the organic material and slow in the underlying marl. Rooting depth is mostly confined to the surface layer. In drained areas some roots extend into the upper few inches of the marl substratum. Available water capacity is low to moderate. The total content of nitrogen is high, but nitrogen is slowly available to plants when the soils are damp and cold. The natural content of phosphorus is very low, and content of potassium is low. The natural content of lime is high.

Some areas of these soils are drained and are in cultivated cropland. Some areas are in native water-tolerant trees and grasses. Prolonged wetness, flooding, and instability are the main limitations to nonfarm uses of these soils.

Representative profile of Martisco muck, in a cultivated field 100 feet east of Black Creek Road and 3/4 mile north of Chestnut Ridge Road in the town of Sullivan:

Ap—10 inches to 0; black (10YR 2/1) sapric material (muck); weak fine subangular blocky structure; friable; many fine roots; few fibers un-

rubbed and no fibers rubbed; 40 percent silt; few fine marl flecks; weakly calcareous; mildly alkaline; abrupt smooth boundary.

C1—0 to 8 inches; light gray (10YR 7/2) marl; common fine distinct yellowish brown (10YR 5/4) mottles; massive; friable; few fine roots in upper part; many fine pores; many white shell remnants; strongly calcareous; strongly alkaline; clear smooth boundary.

C2—8 to 84 inches; gray (10YR 6/1) marl; many medium faint pinkish white (5YR 8/2) areas; massive; friable; common fine and few medium pores; many white shell remnants; strongly calcareous; strongly alkaline.

The thickness of the organic material is 8 to 16 inches. Depth to bedrock is more than 8 feet. Reaction is slightly acid to moderately alkaline in the organic material and moderately alkaline or strongly alkaline in the underlying marl.

Undisturbed areas have an O2 horizon. The O2 or Ap horizon is mainly sapric material (muck) that has 0 to 10 percent fibers, unrubbed, and has few or no fibers after rubbing. The mineral soil material is mainly silt and makes up 0 to 60 percent of the O2 or Ap horizon. Hue is 10YR to 5YR or color is neutral, value is 2, and chroma is 1 or 2. Structure is weak or moderate granular or subangular blocky.

The C horizon is marl. Shell fragments are common to many. Matrix color is in hue of 10YR or is neutral, value is 5 to 8, and chroma is 0 to 2. Higher chroma mottles are present in places. Structure is weak subangular blocky, or the material is massive. Consistence is friable or firm. The thickness of the marl is 35 inches or more.

A IIC horizon that ranges from silty clay to fine sandy loam is below the marl layers in some areas.

Martisco soils commonly are near Edwards and Warners soils. They are similar to Edwards soils but have marl deposits closer to the surface. They have drainage similar to that of Warners soils but have organic material instead of mineral soil material overlying the marl.

Mo—Martisco muck. This is a nearly level soil that formed in a thin mantle of organic material overlying marl. It is in low depressions. In some areas this soil was similar to Edwards soils until it was artificially drained and the organic material subsided and became oxidized. Slopes are mostly 1 percent or less.

Included with this soil in mapping are small areas of a soil that is similar to Warners soils and has a thin silty cap overlying the marl. A few areas of Edwards and Wallkill soils are also included.

If drained, this soil is suited to row crops and vegetables. Drainage generally is not feasible, however, because of the shallow depth to marl and the lack of suitable outlets. In cultivated areas, mixing the marl with the organic surface layer causes deterioration of the chemical and physical characteristics of the soil, thus limiting crop growth. Droughtiness is a problem in summer in overdrained areas. Compaction by heavy equipment is a problem in some areas, where it reduces the rate of internal drainage. Soil blowing can be controlled by using cover crops and by planting windbreaks on field borders. If undrained areas of this soil are left in native vegetation, they provide cover for wildlife but timber production is poor.

The prolonged high water table, hazard of flooding, slow permeability in the substratum, and poor stability are severe limitations to the use of this soil for nonfarm purposes. Some areas have good potential for development of wildlife marshes. The underlying marl has potential as a source of lime for agricultural use. Capability subclass IVw.

Middlebury series

The Middlebury series consists of deep, moderately well drained and somewhat poorly drained soils. These soils formed in recent alluvium that was washed from upland glacial drift with a low to medium content of lime. They are nearly level and are on flood plains along valley bottoms.

In a representative profile the surface layer is dark grayish brown silt loam 9 inches thick. The subsoil is friable, brown light silt loam 13 inches thick that has faint mottles. The substratum extends to a depth of 60 inches. The upper part of the substratum is friable and firm, mottled, grayish brown silt loam; the middle part is a thin layer of friable, dark gray fine sandy loam; and the lower part is gray stratified gravel and sand.

Some areas of these soils are flooded annually, and some areas are flooded only about once in 5 years. A temporary seasonal high water table is in the subsoil early in spring. Depth to the water table depends somewhat on the level of water in adjacent streams. Permeability is mainly moderate but is moderately rapid in the lower part of the substratum. Most roots are confined to the surface layer and upper part of the subsoil, but some roots extend more deeply as the water table lowers late in spring. Available water capacity is high. The natural content of nitrogen is medium to high. The natural supply of phosphorus is low, and supply of available potassium is medium. The natural content of lime is low to medium.

These soils are used mostly for row crops and hay and pasture crops. Small or inaccessible areas are idle or are used for trees. Flooding is the main limitation to nonfarm uses of these soils.

Representative profile of Middlebury silt loam, in a pasture 200 feet south of Lebanon Brook Road and 1/4 mile northwest of the Chenango County line in the town of Lebanon:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium and fine granular structure; friable; many fine roots; medium acid; clear diffuse boundary.

B2—9 to 22 inches; brown (10YR 5/3) light silt loam; common fine faint yellowish brown (10YR 5/6) and few fine faint grayish brown (2.5Y 5/2) mottles in lower part; weak medium subangular blocky structure; friable; many fine roots in upper part; many fine and common medium pores; common dark grayish brown (10YR 4/2) vertical macropores in upper part; medium acid; clear wavy boundary.

C1—22 to 34 inches; grayish brown (2.5Y 5/2) silt loam; common medium distinct strong brown (7.5YR 5/6) and few fine faint dark grayish brown (10YR 4/2) mottles; massive; friable; few fine roots; many fine and few medium pores; few thin clay linings in some pores; slightly acid; abrupt smooth boundary.

C2—34 to 39 inches; grayish brown (2.5Y 5/2) silt loam; many medium distinct gray (10YR 5/1) and strong brown (7.5YR 5/8) mottles; massive; firm; few fine pores; slightly acid; abrupt smooth boundary.

C3—39 to 41 inches; dark gray (10YR 4/2) fine sandy loam; massive; friable; many pores; few woody fragments; slightly acid; abrupt smooth boundary.

IIC4—41 to 60 inches; gray (10YR 5/1) stratified gravel and sand; neutral.

The solum is 18 to 27 inches thick. Depth to bedrock is more than 5 feet. Coarse fragments generally are absent to a depth of 40 inches, but pebbles make up as much as 15 percent, by volume, of subhorizons in some places. Reaction is strongly acid to slightly acid in the solum and slightly acid or neutral in the lower part of the substratum.

Some areas have an A1 horizon. The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma mainly of 2.

The B horizon ranges from silt loam to fine sandy loam. It has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4. High chroma mottles are present, and low chroma mottles are in the lower part in some profiles. Structure is weak or moderate subangular blocky or prismatic. Consistence is friable or very friable.

The C horizon has texture and color similar to those of the B horizon, except it commonly is coarser textured with increasing depth and commonly has chroma of 2 or 1. This darker color is inherited from alluvial sediment. Depth to contrasting gravelly or sandy material generally is 40 to 50 inches.

Middlebury soils formed in alluvium similar to that in which Teel and Weaver soils formed. Middlebury soils are more acid than those soils and are not so silty as Teel soils.

Mr—Middlebury silt loam. This soil is nearly level and formed in silty alluvium. It is on flood plains along relatively narrow valley bottoms. Slopes range from 0 to 3 percent. Because this soil is adjacent to a meandering stream, the individual areas commonly are irregular in shape.

Included with this soil in mapping are a few small areas of poorly drained Wayland soils in depressions and along remnant meander scars. Also included, mostly adjacent to stream channels, are a few areas of soils that are similar to this Middlebury soil but are well drained. Soils, mainly along high gradient streams, that have continuous sandy or gravelly material at a depth of 30 to 40 inches are also included.

This soil is suitable for cultivated crops, hay and pasture, and trees and to some vegetable crops that do not require early planting. This soil is easy to till, but in some years planting is delayed by temporary seasonal wetness or flooding late in spring. In some areas, streambank erosion is a problem and special protective practices are required to control it. Using cover crops and sod crops and returning crop residue to the soil help to maintain good soil tilth and to protect the soil surface from flood scour. Minimum tillage generally is effective on this soil.

Flood hazard and temporary seasonal wetness are the main limitations to nonfarm uses of this soil. Areas around towns and villages can be used as open space corridors. Capability subclass IIw.

Minoa series

The Minoa series consists of deep, somewhat poorly drained soils. These soils formed in glaciolacustrine (lake-laid) deposits that are mainly fine sand and very fine sand. They are nearly level and are in moderately low areas on the lake plain and in a few major valleys.

In a representative profile the surface layer is very dark grayish brown very fine sandy loam 11 inches thick. The subsurface layer is very friable, mottled, brown loamy fine sand 2 inches thick. The subsoil is friable and very friable, mottled, reddish brown fine sandy loam and loamy very fine sand 17 inches thick. The substratum, to a depth of 57 inches, is brown loamy fine sand.

A seasonal high water table is in the upper part of the subsoil early in spring and in other excessively wet periods. Permeability is moderate in the surface layer and subsoil and moderate or moderately rapid in the substratum. In undrained areas roots are mostly confined to the upper 18 inches of soil early in the growing season. As the water table recedes during summer, however, some roots extend to the substratum. Available water capacity is moderate to high. The total content of nitrogen is medium to high, but nitrogen is released slowly to plants in spring when the soils are damp and cold. The natural supply of phosphorus is very low, and supply of potassium is low. The natural content of lime is low to medium.

Many areas of these soils are used for hay and pasture crops and trees. Some areas are drained and are used for cultivated crops. Seasonal wetness is the main limitation to nonfarm uses of these soils.

Representative profile of Minoa very fine sandy loam, in a grassy abandoned field 40 feet east of Schollhammer Road and 0.4 mile north of Canal Road in the city of Oneida:

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) very fine sandy loam, light brownish gray (10YR 6/2) dry; weak medium and fine granular structure; very friable; many fine and common medium roots; medium acid; abrupt smooth boundary.

A2—11 to 13 inches; brown (10YR 5/3) loamy very fine sand; common medium and fine distinct strong brown (7.5YR 5/6) mottles; weak medium and fine subangular blocky structure; very friable; common fine roots; many fine pores; few patchy light brownish gray (10YR 6/2) skeletons on faces of peds; medium acid; abrupt wavy boundary.

B2—13 to 18 inches; reddish brown (5YR 4/3) fine sandy loam; many medium distinct strong brown (7.5YR 5/8) and yellowish red (5YR 5/6) mottles and common fine faint pinkish gray (5YR 6/2) streak mottles; weak medium and fine subangular blocky structure; friable; common fine roots; common fine pores; few reddish brown (5YR 4/4) loam nodules; clay bridging between some sand grains; slightly acid; clear wavy boundary.

B3—18 to 30 inches; reddish brown (5YR 5/3) loamy very fine sand; many medium distinct yellowish red (5YR 5/8) and few fine faint pinkish gray (5YR 6/2) mottles; weak medium subangular blocky structure; very friable; few fine roots in upper part; common fine pores; slightly acid; gradual wavy boundary.

C—30 to 47 inches; brown (10YR 4/3) loamy fine sand; common medium distinct strong brown (7.5YR 5/8) and few brown (7.5YR 5/2) mottles; massive; friable; few thin dark brown (7.5YR 4/4) lamellae of very fine sandy loam; slightly acid grading to neutral at a depth of 40 inches.

The solum is 26 to 35 inches thick. Depth to carbonates is 40 to 60 inches and depth to bedrock is more than 5 feet. Coarse fragments generally are absent but make up as much as 5 percent of individual subhorizons in some profiles. Reaction is strongly acid to neutral in the solum and upper part of the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value mainly of 3 or 4, and chroma mainly of 2. Consistence is friable or very friable. Undisturbed areas have an A1 horizon. Where present, the A1 horizon has value and chroma slightly lower than those of the Ap horizon.

The A2 horizon ranges from fine sandy loam to loamy very fine sand. It has hue of 10YR or 7.5YR, value of 5, and chroma of 2 or 3. Some areas do not have an A2 horizon.

The B horizon ranges from silt loam to loamy very fine sand. It has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. Where matrix chroma is more than 2, mottles with chroma of 2 or lower are in the B horizon. Structure is weak or absent. Consistence ranges from firm to very friable. Thin lamellae that have slightly finer texture than that of the matrix are in the lower part of the B3 horizon or in the C horizon.

The C horizon ranges from silt loam to loamy fine sand.

Minoa soils form a drainage sequence with well drained Arkport soils, moderately well drained Galen soils, and poorly drained and very poorly drained Lamson soils. Minoa soils are near Raynham soils. They are similar to Raynham soils but have more sand and less silt throughout the profile.

Mt—Minoa very fine sandy loam. This soil is nearly level and formed in deltaic deposits of old glacial lakes. It is in moderately low areas. Slopes range from 0 to 3 percent. This soil generally receives subsurface seepage from adjacent higher soils.

Included with this soil in mapping are areas of a soil that is similar to this Minoa soil but has more than 18 percent clay in the subsoil. Many areas of this included soil are just west of the city of Oneida. Poorly drained and very poorly drained Lamson soils in a few small depressions and a few small areas of soils that have slopes of as much as 5 percent are also included.

If undrained, this soil is best suited to hay and pasture plants and trees that can tolerate wetness early in the growing season. If drained, it is suited to most crops commonly grown in the survey area and is especially well suited to vegetable crops. Subsurface drains function well if outlets are available. Special practices, for example, using filters or wrapping the tile joints, are required in some places to prevent sand from plugging the drains. This soil is easy to till at the proper moisture content and generally does not crust or clod. Use of cover crops, returning crop residue to the soil, and minimum tillage are practices that help to maintain good soil tilth if row crops are grown intensively. In drained areas this soil has excellent response to applications of lime and large amounts of fertilizer.

Seasonal wetness is the main limitation to the use of this soil for nonfarm purposes. Sidewalls are unstable during the installation of underground utilities. Capability subclass IIIw.

Naumburg series

The Naumburg series consists of deep, somewhat poorly drained and poorly drained soils. These soils formed mainly in glaciolacustrine and glaciofluvial deposits and also in eolian deposits. The deposits are mainly fine sand. These soils are nearly level and are in moderately low areas on the lake plain.

In a representative profile the surface layer is dark gray loamy fine sand 9 inches thick. The subsoil is 25 inches thick. The upper 7 inches is firm, mottled, dark brown loamy fine sand; the middle 10 inches is very friable, mottled, brown loamy fine sand; and the lower 8 inches is very friable, mottled, brown loamy fine and medium sand. The substratum, to a depth of 60 inches, is very friable, grayish brown fine sand.

A seasonal high water table is in the upper part of the subsoil in spring. Permeability is mainly rapid. The firm, dense portion of the upper part of the subsoil somewhat restricts the downward movement of water. In undrained areas rooting depth is mainly confined to the upper part of the subsoil. In drained areas root penetration is excellent. Available water capacity is low. The total natural content of nitrogen is medium to high, but nitrogen is released slowly to plants when the soils are wet and cold. The supply of available phosphorus is very low, and content of potassium is low. The natural content of lime is low.

Many areas of these soils are used for pasture and trees or are idle. A few areas are drained and are used for cultivated crops and vegetables. Seasonal wetness is the main limitation to nonfarm uses of these soils.

Representative profile of Naumburg loamy fine sand, in an overgrown and wooded area 30 feet west of the end of Stone Drive and 0.2 mile south of Chestnut Ridge Road in the town of Sullivan:

Ap—0 to 9 inches; dark gray (10YR 4/1) loamy fine sand, light gray (10YR 6/1) dry; weak medium granular structure; very friable; few medium and large roots and many fine roots; few light brownish gray (10YR 6/2) clean sand grains; strongly acid; abrupt smooth boundary.

B21ir—9 to 16 inches; dark brown (7.5YR 4/4) loamy fine sand; few fine distinct strong brown (7.5YR 5/6) and grayish brown (10YR 5/2) mottles; very weak fine granular structure; friable; 35 percent dark reddish brown (5YR 3/4) firm material and few very firm dark reddish brown (2.5YR 2/4) nodules; common fine roots; few fine pores; strongly acid; clear wavy boundary.

B22—16 to 26 inches; brown (10YR 5/3) loamy fine sand; many large distinct strong brown (7.5YR 5/6) and few fine faint grayish brown (10YR 5/2) mottles; very weak medium granular structure; very friable; and few firm brown (7.5YR 4/4) lumps in upper part; common fine pores; strongly acid; gradual wavy boundary.

B3—26 to 34 inches; brown (7.5YR 5/2) loamy fine and medium sand with a few lenses of fine sandy loam; common medium distinct strong brown (7.5YR 5/8) and common fine faint reddish gray (5YR 5/2) mottles; massive; very friable; strongly acid; gradual wavy boundary.

C—34 to 60 inches; grayish brown (10YR 5/2) fine sand; many medium faint brown (10YR 5/3) and common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; slightly acid.

The solum is 20 to 38 inches thick. Carbonates, where present, are at a depth of more than 60 inches. Depth to bedrock is more than 5 feet. Coarse fragments are absent or few throughout the profile. Reaction is extremely acid to strongly acid in the upper part of the solum and very strongly acid to slightly acid in the substratum.

Undisturbed areas have an O2 horizon that is as much as 4 inches thick or an A1 horizon that commonly is underlain by an A2 horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 1 or 2. Structure is weak or moderate granular.

Where a thin A2 horizon is present, it has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2.

The B horizon ranges from loamy fine sand to sand. Some areas have a Bh horizon. Where present, the Bh horizon has hue of 10YR to 5YR, value of 2 or 3, and chroma of 1 or 2. The Bir horizon has hue of 10YR to 5YR, value of 3 or 4, and chroma of 2 to 4. The rest of the B horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. Mottles of high and low chroma are present. Structure in the B horizon is very weak, or the material is massive. Consistence is mainly friable or very firm, except the consistence of 20 to 40 percent of the material in the Bh and Bir horizons is cemented ortstein that is firm or very firm.

The C horizon ranges from loamy fine sand to sand. Consistence is loose or very friable.

Naumburg soils in this survey area have a warmer temperature regime than Naumburg soils mapped in other survey areas. This difference, however, does not affect the use and management of the soils.

Naumburg soils formed in sandy parent material similar to that in which the somewhat excessively drained Colonie soils, the moderately well drained Elnora soils, and the poorly drained Wareham soils formed. Naumburg soils have less clay and more sand than the somewhat poorly drained Minoa soils.

Na—Naumburg loamy fine sand. This soil is nearly level and formed in water- and wind-laid sandy deposits. It is in moderately low areas. This soil is mostly somewhat poorly drained, but in a few areas it is poorly drained. Slopes range from 0 to 3 percent. This soil receives little or no runoff from adjacent soils.

Included with this soil in mapping are a few areas of soils that have a surface layer of fine sandy loam or very fine sandy loam. Also included are a few areas of soils that have fine sandy loam in the lower part of the subsoil. A few areas of soils that do not have cemented material in the upper part of the subsoil are also included.

If undrained, this soil is best suited to water-tolerant hay and pasture plants or to trees. If drained, it is well suited to vegetables and some field crops. Where suitable outlets are available, surface and subsurface drains function well. Special practices, for example, use of filters, generally are required to prevent sloughing and flowing sand from clogging the drains. If drained, this soil is easy to till and responds exceptionally well to applications of lime and fertilizer. Droughtiness is a problem in midsummer in some drained areas. The hazard of soil blowing is slight in cultivated areas.

Seasonal wetness is the main limitation to the use of this soil for nonfarm purposes. Sidewalls of installations for underground utilities and ditchbanks are quite unstable. Capability subclass IIIw.

Niagara series

The Niagara series consists of deep, somewhat poorly drained soils. These soils formed in glaciolacustrine (lake-laid) sediment that is mainly silt. They are nearly level and gently sloping and are in moderately low areas on the lake plain and in a few major valleys.

In a representative profile the surface layer is very dark grayish brown silt loam 8 inches thick. The subsurface layer is mottled, grayish brown silt loam 5 inches thick. The upper part of the subsoil is firm, mottled, reddish gray light silty clay loam 13 inches thick, and the lower part is friable, mottled, brown silt loam 10 inches thick. The substratum, to a depth of 58 inches, is friable, grayish brown varved silt and very fine sand.

A seasonal high water table is in the upper part of the subsoil in spring and in other excessively wet periods. Permeability is moderate in the surface layer and moderately slow in the subsoil and substratum. In undrained areas rooting depth is mostly confined to the upper part of the subsoil, but some roots extend more deeply as the water table recedes during the summer. In drained areas root penetration is good. Available water capacity is high. The total content of nitrogen is medium to high, but nitrogen is released slowly to plants when the soils are damp and cold. The natural supply of phosphorus is low, and content of available potassium is medium. The natural content of lime is medium to high.

Many areas of these soils are used for pasture and hay crops. Some areas are used for trees. A few areas are drained and are used for cultivated crops. Seasonal wetness is the main limitation to nonfarm uses of these soils.

Representative profile of Niagara silt loam, 0 to 3 percent slopes, 100 feet east of North Road and 1/2 mile north of State Route 31 in the town of Sullivan:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) rubbed; moderate medium and fine granular structure; friable; many fine and few medium roots; neutral; clear smooth boundary.

A2—8 to 13 inches; grayish brown (10YR 5/2) silt loam; many medium distinct dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6) mottles and few fine faint gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; patchy clay linings in pores; common dark grayish brown (10YR 4/2) vertical wormcasts; neutral; gradual wavy boundary.

B2t—13 to 26 inches; reddish gray (5YR 5/2) light silty clay loam; many (50 percent) medium distinct brown (7.5YR 5/4) and reddish brown (5YR 4/4) mottles in interior of peds in upper part and few threadlike light olive gray (5Y 6/2) streak mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm and slightly sticky; few fine roots in upper part along cleavage faces; common fine pores; thick clay linings in pores; thick patchy grayish brown (10YR 5/2) clay films on exteriors of peds; neutral; gradual wavy boundary.

B3—26 to 36 inches; brown (7.5YR 5/2) silt loam; many (30 percent) medium and coarse distinct reddish brown (5YR 4/4) and yellowish red (5YR 5/6) mottles; weak coarse prismatic structure parting to weak medium platy; friable; common fine pores; patchy clay linings in pores; mildly alkaline; gradual wavy boundary.

C—36 to 58 inches; grayish brown (10YR 5/2) varved silt and very fine sand; many (20 percent) medium distinct strong brown (7.5YR 5/6) mottles; moderate thick platy structure; friable; few fine pores; few pinkish gray (5YR 7/2) segregated lime coats; strongly calcareous; moderately alkaline.

The solum is 22 to 40 inches thick. Depth to carbonates ranges from 22 inches to slightly more than 40 inches. Depth to bedrock is more than 5 feet. Coarse fragments are very few or are absent. Reaction in the solum is medium acid to mildly alkaline and generally is more alkaline with increasing depth.

The Ap horizon has hue mainly of 10YR, value of 3 or 4, and chroma of 2. Consistence is friable or very friable.

The A2 horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma mainly of 2.

The B2t horizon is silt loam or light silty clay loam. It has hue of 10YR to 5YR, value of 4 or 5, and chroma mainly of 2. In the upper part the dominant chroma is 3 or higher. Mottles are common or many. Structure is prismatic or subangular blocky, or both. Consistence is friable or firm.

The C horizon commonly is varved with silt, very fine sand, fine sand, and a smaller amount of clay. Color is similar to that of the Bt horizon. Consistence is friable or firm. A coarser textured IIC horizon is in some profiles below a depth of 50 inches.

Niagara soils form a drainage sequence with the moderately well drained Collamer soils and the poorly drained and very poorly drained Canandaigua soils. Niagara soils have a higher clay content than the somewhat poorly drained and poorly drained, silty Raynham soils.

NgA—Niagara silt loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representa-

tive of the series. It is in moderately low areas and receives little runoff from adjacent soils.

Included with this soil in mapping are a few small areas of poorly drained and very poorly drained Canandaigua soils in slight depressions and along shallow drainageways. Most of these areas are indicated on the soil maps by the symbol for a wet spot or field drainageway. Also included are a few small areas of a soil, mostly in the northern part of the town of Sullivan, that is similar to this Niagara soil but is moderately deep to glacial till.

This soil is suited to cultivated crops, hay and pasture, and trees. Cultivated crops grow better in drained areas than in undrained areas where seasonal wetness excessively delays normal tillage operations in spring. Subsurface drains may require use of wrapped joints or filters to prevent very fine sand and silt from plugging the drains. In some areas a bedding system can be used to improve surface drainage. This soil is easy to till at the proper moisture content. Use of cover crops, return of crop residue to the soil, and occasionally including sod crops in the cropping system are practices that help to maintain good soil tilth.

Seasonal wetness and moderately slow permeability in the subsoil and substratum are limitations to some nonfarm uses of this soil. Fill is required in some areas to raise basements and septic effluent fields above the level of the seasonal high water table. Capability subclass IIIw.

NgB—Niagara silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, except mottles are fewer and less distinct just below the surface. Slopes are plane or slightly concave. This soil commonly receives a moderate amount of runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of poorly drained and very poorly drained Canandaigua soils in shallow drainageways. These areas are indicated on the soil maps by the symbol for a field drainageway. A few small areas of moderately well drained Collamer soils and finer textured Odessa soils are also included.

This soil is suited to hay and pasture crops and trees. Cultivated crops grow better in drained areas than in undrained areas. Drainage practices should include the use of interceptor drains to divert runoff and subsurface seepage from higher adjacent soils. Adequate drainage is somewhat easier to establish on this soil than in the nearly level Niagara soil. Erosion is a hazard in intensively cultivated areas. Minimum tillage, use of cover crops, return of crop residue to the soil, and cross slope cultivation are practices that reduce erosion and help to maintain good soil tilth.

Seasonal wetness, moderately slow permeability in the subsoil and substratum and slope are limitations to the use of this soil for nonfarm purposes. Capability subclass IIIw.

Odessa series

The Odessa series consists of deep, somewhat poorly drained soils. These soils formed in reddish glaciolacustrine deposits that are mainly clay and silt. They are nearly level and are in moderately low areas on the lake plain and in some of the major valleys.

In a representative profile the surface layer is dark grayish brown heavy silt loam 8 inches thick. The subsurface layer is leached, mottled, grayish brown silt loam 4 inches thick. The subsoil is 10 inches thick and is mottled, reddish brown heavy silty clay loam that is firm and plastic. The substratum is mottled, firm and plastic, reddish brown silty clay loam to a depth of 37 inches and is variegated, varved fine silt and clay to a depth of 59 inches.

A seasonal high water table commonly is perched above the subsoil early in spring and in other excessively wet periods. Permeability is moderately slow in the surface layer, slow or very slow in the subsoil, and very slow in the substratum. Most roots are confined to the upper part of the subsoil. As the water table subsides late in spring, however, some roots extend more deeply. Still, the fine textured subsoil generally is a poor medium for root development. Available water capacity is moderate to high. The natural content of nitrogen is medium to high, but nitrogen is released slowly to plants in spring when the soils are damp and cold. The supply of natural phosphorus is low to medium, and content of available potassium is high. The natural content of lime is medium to high.

Most areas of these soils are used for hay and pasture crops and trees. A few areas are partially drained and are used for cultivated crops. Seasonal wetness and very slow permeability are the main limitations to nonfarm uses of these soils.

Representative profile of Odessa silt loam, in a hayfield 70 feet west of Fly Road and 300 yards south of Smith Ridge Road in the town of Sullivan:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) heavy silt loam; weak medium and fine granular structure; friable; many fine roots; slightly acid; clear smooth boundary.

A2—8 to 12 inches; grayish brown (10YR 5/2) heavy silt loam; many medium distinct strong brown (7.5YR 5/6) mottles and few fine faint light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable and slightly plastic; common fine roots; many fine pores; 10 percent brown (7.5YR 4/4) ped centers in lower part; slightly acid; clear wavy boundary.

B2t—12 to 22 inches; reddish brown (5YR 4/3) heavy silty clay loam; many fine and medium distinct brown (7.5YR 5/4) and yellowish red (5YR 5/8) mottles and few fine distinct threadlike light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to moderate coarse subangular blocky; firm and plastic; few fine roots; thin brown (7.5YR 5/2) silty ped exteriors in upper 2 inches; common fine pores; clay linings in pores; thick patchy reddish gray (5YR 5/2) clay films on faces of peds; neutral; clear gradual boundary.

C1—22 to 37 inches; reddish brown (5YR 4/4) silty clay loam; many medium and fine distinct strong brown (7.5YR 5/6) and reddish gray (5YR 5/2) mottles; moderate medium and thick platy structure; firm and plastic; few fine pores; few patchy clay films in upper part; gray (5YR 6/1) secondary lime coats along faces of

plates; strongly calcareous; moderately alkaline; clear wavy boundary.

C2—37 to 59 inches; variegated pink (5YR 7/3), grayish brown (10YR 5/2), reddish brown (5YR 5/3), and strong brown (7.5YR 5/6) varved fine silt and clay; strong thin and medium platy structure; firm; secondary light gray (5YR 7/1) lime coats on faces of peds; strongly calcareous; moderately alkaline.

The thickness of the solum and the depth to carbonates are 20 to 35 inches. Depth to bedrock is more than 5 feet. Coarse fragments are very few or are absent throughout the profile. Reaction is medium acid to neutral in the upper part of the solum and slightly acid to mildly alkaline in the lower part of the solum. A coarse textured IIC horizon is at a depth of more than 40 inches in some profiles.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2. Structure is subangular blocky or granular.

The A2 horizon has hue of 10YR to 7.5YR, value of 5 to 7, and chroma mainly of 2. Consistence is friable or firm. Some profiles have a B&A horizon instead of an A2 horizon.

The B2t horizon is heavy silty clay loam, silty clay, or clay. It has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 2 to 4. Ped interiors have chroma of 3 or higher in the upper part, but ped exteriors have chroma of 2. Consistence is firm and is sticky and plastic when the soil is wet.

The C horizon is silty clay loam and silty clay and varved clay, silt, and very fine sand. Color is variable. Structure is platy, or the material is massive.

Odessa soils form a drainage sequence with moderately well drained and well drained Schoharie soils and poorly drained and very poorly drained Lakemont soils. Odessa soils commonly are near the silty Niagara soils. They have drainage similar to that of Niagara soils but have a higher content of clay in the subsoil.

Od—Odessa silt loam. This soil is nearly level and formed in glacial lake sediment. Slopes range from 0 to 3 percent. In most areas this soil receives little or no runoff from higher adjacent soils.

Included with this soil in mapping are a few areas of soils that have slopes of 3 to 6 percent. Also included are poorly drained and very poorly drained Lakemont soils in slight depressions and along field drainageways. Also included are a few large areas of soils that are similar to this Odessa soil but lack its reddish color. In the northwestern part of the county, a few small areas of soils that are underlain by glacial till at a depth of less than 40 inches are also included.

This soil is suited to water-tolerant hay and pasture plants and to trees. If artificially drained, it is suited to cultivated crops. Drains must be closely spaced to be effective because of the slowly or very slowly permeable, fine textured subsoil. Bedding can be used to improve surface drainage. This soil is not difficult to till at the proper moisture content. Use of cover crops, return of crop residue to the soil, and including a high proportion of sod crops in the cropping system are important practices that help to maintain good soil tilth and reduce the hazard of clodding and crusting.

Seasonal wetness, very slow permeability, and fine texture in the subsoil are limitations to the use of this soil for nonfarm purposes. Low bearing strength is a limitation for some nonfarm purposes. Some areas have good potential as sites for dugout ponds. Capability subclass IIIw.

Ontario Variant

The Ontario Variant consists of deep, well drained soils. These soils formed in reddish glacial till derived from sandstone, limestone, and shale. They are gently sloping or sloping and are on the low upland plateau and in a few islandlike areas on the lake plain.

In a representative profile the surface layer is brown loam 12 inches thick. The subsurface layer is friable, grayish brown gravelly loam 8 inches thick. The subsoil is friable, reddish brown and dark brown gravelly heavy loam 18 inches thick. The substratum, to a depth of 61 inches is friable, mottled, brown gravelly loam.

The seasonal high water table generally is well below the subsoil. Permeability is moderate throughout the soil. Root penetration and development are excellent. Available water capacity is moderate to high. The natural content of nitrogen is medium, supply of phosphorus is low, and supply of available potassium is high. The natural content of lime is medium.

Most areas of these soils are used for cultivated crops and hay. A few areas are used for pasture and trees. There are few limitations to nonfarm uses of these soils.

Representative profile of Ontario Variant loam, 3 to 8 percent slopes, in a grainfield 150 yards south of Ballina Road and 0.3 mile west of East Road in the town of Cazenovia:

Ap—0 to 12 inches, brown (7.5YR 5/2) loam; moderate fine granular structure; friable; many fine and few medium roots; 10 percent coarse fragments; neutral; abrupt smooth boundary.

A&B—12 to 20 inches, grayish brown (10YR 5/2) gravelly loam that has a few thin lenses of fine sandy loam; weak fine subangular blocky structure; friable; common fine roots; many fine and few medium pores; 30 percent reddish brown (5YR 4/3) ped centers; clay linings in pores and in interior of peds; 15 percent coarse fragments; slightly acid; gradual irregular boundary.

B&A—20 to 26 inches; reddish brown (5YR 4/3) gravelly heavy loam; moderate medium subangular blocky structure; friable; common fine roots; many fine pores; coatings are brown (7.5YR 5/2) gravelly loam; pinkish gray (7.5YR 7/2) dry, 1 to 3 millimeters thick, on faces of peds, thick clay linings in pores; 20 percent coarse fragments; neutral; gradual wavy boundary.

B2t—26 to 38 inches; dark brown (7.5YR 4/4) gravelly heavy loam; moderate medium subangular blocky structure; friable; few fine roots; many fine pores; thick clay linings in pores and patchy (25 percent) clay films on faces of peds; 25 percent coarse fragments; neutral; gradual wavy boundary.

C—38 to 61 inches; brown (7.5YR 5/2) gravelly loam that has a few discontinuous lenses of silt loam and sandy loam; few fine faint brown (7.5YR 5/4) mottles; weak medium and thick platy structure; friable; common fine pores; few thin clay films in upper part; 30 percent coarse fragments; strongly calcareous; moderately alkaline.

The thickness of the solum and the depth to carbonates range from 36 to 44 inches. Depth to bedrock is more than 5 feet. Coarse fragments are mainly gravel and cobbles of mixed lithology. They make up 3 to 25 percent, by volume, of the solum and as much as 50 percent of the substratum. Reaction in the solum ranges from strongly acid to neutral.

Some areas have an A1 horizon. The Ap or A1 horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma mostly of 2. Consistence is friable or very friable.

The A&B horizon is loam, and gravelly analogues are in some profiles. The A portion has hue of 10YR to 5YR, value of 5 or 6, and chroma of 2 to 4. The B portion has similar hue and chroma but has value of 4 or 5. Some areas have an A2 horizon instead of an A&B horizon.

The B&A horizon has texture similar to that of the Bt horizon.

The Bt horizon is loam or light sandy clay loam, and gravelly analogues are in some profiles. Color is similar to that of the B portion of the A&B or B&A horizon. Structure is moderate medium or coarse subangular blocky.

The C horizon is gravelly or very gravelly fine sandy loam or loam. It has hue of 10YR to 5YR, value of 4 or 5, and chroma mostly of 2. Structure is weak platy, or the material is massive. Consistence is friable.

Ontario Variant soils formed in parent material similar to that in which moderately well drained Hilton soils, somewhat poorly drained Appleton soils, and poorly drained and very poorly drained Lyons soils formed. Ontario Variant soils commonly are near Honeoye soils. They are similar to Honeoye soils but are deeper to calcareous material and have a thicker solum.

OnB—Ontario Variant loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the Ontario Variant. Slopes are slightly convex. This soil receives little or no runoff from higher adjacent soils. Some upland areas are undulating.

Included with this soil in mapping are a few small areas of moderately well drained Hilton soils and somewhat poorly drained Appleton soils in slight depressions and along field drainageways. These included soils are indicated on the soil maps by the symbol for a wet spot or field drainageway. Also included are a few small areas of nearly level Ontario Variant soils and a few areas of a soil that is similar to this Ontario Variant soil but has a coarser textured substratum that contains less than 18 percent clay.

This soil is well suited to cultivated crops and hay. Corn and alfalfa grow especially well. This soil can be intensively cultivated if erosion is controlled. Use of cover crops, minimum tillage, return of crop residue to the soil, and cross slope tillage are measures that help to control erosion, conserve moisture, and maintain good soil tilth. This soil can be tilled fairly early in spring and is quite easy to till, except stone fragments hinder tillage in some areas.

This soil has few limitations to nonfarm uses that require good drainage. Most areas have excellent potential as homesites. Capability subclass IIe.

OnC—Ontario Variant loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the Ontario Variant, except the surface layer is slightly thinner and mottles are at a greater depth or are absent. Slopes are slightly convex. This soil generally receives a small amount of runoff from higher adjacent soils.

Included with this soil in mapping are small areas of moderately well drained Hilton soils mostly along drainageways. Also included are a few small areas of soils that have slopes of 15 to 20 percent and a few areas of a soil that is similar to this Ontario Variant soil but has a coarser textured subsoil that is less than 18 percent clay.

This soil is suited to small grain crops, hay and pasture, and trees. It also is suited to cultivated crops, but conservation practices are required to reduce erosion and to conserve moisture. These practices include contour tillage, use of cover crops, return of crop residue to the soil, minimum tillage, and stripcropping on long slopes. Planting and harvesting are slightly more difficult on this soil than on the gently sloping Ontario Variant soil. Stone fragments in places slightly hinder some tillage operations.

Slope is a limitation to the use of this soil for some nonfarm purposes that require good drainage. Some areas have a scenic view and have potential as homesites, but care is needed in the selection of the site and in the location of septic effluent fields. Capability subclass IIIe.

Ovid series

The Ovid series consists of deep, somewhat poorly drained and moderately well drained soils. These soils formed in glacial till derived from red shale, limestone, and sandstone. The till commonly is mixed with reglaciated lacustrine sediment. These soils are nearly level and gently sloping and are on the low upland plateau and in islandlike areas on the lake plain.

In a representative profile the surface layer is dark brown silt loam 10 inches thick. The subsurface layer is mottled, brown heavy silt loam 4 inches thick. The subsoil is firm, mottled, reddish brown silty clay loam 19 inches thick. The substratum, to a depth of 60 inches, is firm, reddish brown light silty clay loam.

A seasonal high water table is in the upper part of the subsoil early in spring and in other excessively wet periods. It commonly is perched above the moderately slowly permeable subsoil or the slowly permeable substratum. Rooting depth is mostly confined to the upper part of the subsoil, but some roots extend more deeply as the water table recedes late in spring. Available water capacity is moderate to high. The natural supply of nitrogen is medium to high, but nitrogen is released slowly to plants when the soils are damp and cold in spring. The natural content of phosphorus is low, and content of available potassium is high. The natural content of lime is medium to high.

Most areas of these soils are used for hay and pasture crops and trees or are idle. Some areas are drained and are used for cultivated crops. Seasonal wetness is the main limitation to nonfarm uses of these soils.

Representative profile of Ovid silt loam, 0 to 3 percent slopes, in a meadow 40 feet south of Michigan Road and 30 feet west of Roberts Road in the town of Fenner:

Ap—0 to 10 inches; dark brown (7.5YR 3/2) silt loam, pinkish gray (7.5YR 6/2) dry; moderate fine and medium granular structure; friable; many fine roots; 3 percent coarse fragments; neutral (limed); abrupt smooth boundary.

A&B—10 to 14 inches; brown (7.5YR 5/2) heavy silt loam; common fine distinct brown (7.5YR 4/4) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; common fine roots; many fine pores; clay lining in some pores in ped interiors; 25 percent reddish brown (5YR 4/3) ped interiors; few lighter skeletons on faces of peds; 5 percent coarse fragments; slightly acid; gradual wavy boundary.

B2t—14 to 33 inches; reddish brown (5YR 4/3) silty clay loam; common fine distinct gray (5Y 6/1) threadlike mottles and common medium distinct strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to moderate medium and coarse suban-

gular blocky; firm and sticky; few fine roots in upper part; common fine pores; thick clay linings in pores and thick patchy clay films on faces of peds; brown (7.5YR 5/2) faces of peds; 10 percent coarse fragments and few dark shale chips; neutral; gradual wavy boundary.

C—33 to 60 inches; reddish brown (5YR 5/3) light silty clay loam; many medium distinct strong brown (7.5YR 5/6) and dark brown (7.5YR 4/4) mottles and common fine distinct gray (5Y 5/1) threadlike mottles; weak medium platy structure; firm; common fine pores; few thin clay films on faces of peds and lining pores in upper part; few pinkish gray (5YR 7/2) lime coats; 10 percent coarse fragments grading to 25 percent in lower part; strongly calcareous; moderately alkaline.

The thickness of the solum and the depth to carbonates range from 20 to 38 inches. Depth to bedrock is more than 5 feet. Coarse fragments are mainly hard gravel and soft shale chips. They make up to 25 percent, by volume, of the solum and as much as 35 percent of the substratum. Reaction is medium acid to neutral in the upper part of the solum and slightly acid to mildly alkaline in the lower part of the solum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2.

The A&B horizon has hue mainly of 7.5YR, value of 5 or 6, and chroma of 2. High chroma mottles are few or common. The B portion of the A&B horizon is similar to the Bt horizon. Some areas have an A2 horizon instead of an A&B horizon.

The Bt horizon is clay loam or silty clay loam, and gravelly analogues are in some profiles. The average content of clay is 28 to 35 percent. The Bt horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4. Material on faces of peds has chroma of 2. Mottles of high and low chroma are present. Structure is prismatic or subangular blocky, or both.

The C horizon is light silty clay loam or light clay loam, and gravelly analogues are common. Color is similar to that of the Bt horizon. Structure is platy or subangular blocky.

Ovid soils form a drainage sequence with the well drained and moderately well drained Cazenovia soils. They commonly are near Appleton and Odessa soils. Ovid soils are similar to those soils, but they have more clay in the subsoil than Appleton soils and less clay than Odessa soils.

OvA—Ovid silt loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. It generally receives a small amount of runoff from adjacent soils. It is mostly somewhat poorly drained. Runoff is slow.

Included with this soil in mapping are a few small areas of a soil that is similar to this Ovid soil but is poorly drained in slight depressions and along field drainageways. A few small areas of gently sloping Ovid soil are also included.

This soil is suited to hay and pasture crops, trees, and some cultivated crops. Drainage is the principal management concern. Randomly placed subsurface drains for wet spots, patterned subsurface drainage systems, and interceptor drains to divert runoff can be used in areas where row crops are grown. In some areas the drains should be moderately closely spaced because of moderately slow permeability in the subsoil. Practices including minimum tillage, use of cover crops, and return of crop residue to the soil help to maintain good soil tilth in intensively cultivated areas.

Seasonal wetness and slow permeability in the substratum are limitations to the use of this soil for some nonfarm purposes. Many areas have potential as sites for dugout ponds. Capability subclass IIIw.

OvB—Ovid silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, except mottles are fewer and less distinct directly below the surface layer. This soil is mainly in the drier half of the somewhat poorly drained class but is also in the wetter half of the moderately well drained class. It commonly receives runoff from higher adjacent soils. Some areas are undulating.

Included with this soil in mapping are a few small areas of soils that have slopes of 8 to 15 percent. A soil along drainageways and in slight depressions that is similar to this Ovid soil but is poorly drained is also included.

This soil is suited to hay and pasture crops, trees, and some cultivated crops. Artificial drainage is needed for most crops because wetness excessively delays planting in spring. Interceptor drains can be used to divert runoff in many areas. Establishing adequate drainage generally is easier on this soil than on the nearly level Ovid soil. Maintaining good soil tilth and controlling erosion are problems in cultivated areas. These problems can be controlled by practices that include contour tillage, use of cover crops, and minimum tillage.

Seasonal wetness, slow permeability in the substratum, and slope are limitations to nonfarm uses of this soil. Adequate drainage commonly is difficult to establish if this soil is used for homesites. Some areas have potential as sites for diked ponds. Capability subclass IIIw.

Palms series

The Palms series consists of very poorly drained, well decomposed organic soils that are underlain by loamy mineral soil material at a depth of 16 to 51 inches. These soils are nearly level and are in low depressions on the lake plain and upland till plain and in small pockets on outwash plains.

In a representative profile the surface layer is black muck (sapric material) 8 inches thick. The underlying organic layers, to a depth of 30 inches, are friable, black and very dark brown, well decomposed muck (sapric material). The substratum, to a depth of 60 inches, is dark gray silt loam.

The water table in undrained areas is at or near the surface throughout the year. Ponding or flooding is common in spring. Permeability is moderate to moderately rapid in the muck layers and is moderately slow to moderate in the mineral soil substratum. In undrained areas rooting depth is mainly confined to the surface layer. If the soils are adequately drained, some roots extend into the substratum. Available water capacity is high. The total content of nitrogen is high, but nitrogen is released slowly to plants when the soils are cold and wet. The supply of phosphorus is very low, and content of potassium is low. The natural content of lime is medium to low.

Most areas of these soils on the lake plain are drained and are used for cultivated crops. Most areas in the

uplands are undrained and are in native vegetation. Prolonged wetness and the instability of the organic material are the main limitations to nonfarm uses of these soils.

Representative profile of Palms muck, in a wooded area 120 feet west of Old County Road and 1.7 miles north of its junction with Oxbow Road in the town of Smithfield:

Oa1—0 to 8 inches; black (10YR 2/1) broken face and rubbed sapric material (muck); 10 percent fibers, about 2 percent rubbed; weak fine granular structure; friable and slightly sticky; many fine and common medium live roots; recognizable fibers are herbaceous; 30 percent mineral soil material; 10 percent woody fragments; slightly acid; clear smooth boundary.

Oa2—8 to 19 inches; black (10YR 2/1) broken face and rubbed sapric material (muck); 15 percent fibers, less than 2 percent rubbed; weak coarse subangular blocky structure; friable and slightly sticky; few fine live roots in upper part; fibers are mainly herbaceous; 20 percent mineral soil material; 10 percent woody fragments and few cedar logs; slightly acid; clear smooth boundary.

Oa3—19 to 30 inches; black (10YR 2/1) sapric material (muck), very dark brown (10YR 2/1) rubbed; 10 percent fibers, less than 2 percent rubbed; weak coarse subangular blocky structure; friable (slightly firmer than layer above) and slightly sticky; fibers are herbaceous; 35 percent mineral material; 15 percent tan woody fragments and few cedar logs; slightly acid; abrupt smooth boundary.

IICg—30 to 60 inches; dark gray (N 4/0) silt loam; weak thin platy structure; friable, slightly sticky when wet; few pores; 10 percent coarse fragments; weakly calcareous; mildly alkaline grading to moderately alkaline.

Depth to the mineral soil substratum ranges from 16 to 50 inches. Depth to bedrock is more than 5 feet. Woody fragments are twigs, stems, bark chips, and logs and make up as much as 15 percent, by volume, of individual organic subhorizons. Reaction is medium acid to neutral in the organic material and slightly acid to moderately alkaline in the mineral soil substratum. Fibers in the organic material are mainly herbaceous, but some fibers are less recognizable and are woody.

The surface layer (Oa1 or Oap horizon) has hue of 10YR or the color is neutral and has value mainly of 2 and chroma of 0 to 2.

The Oa2 and Oa3 horizons are mainly sapric material, but thin layers of hemic material are in some profiles. Mineral soil material is mainly silt and makes up as much as 50 percent of individual subhorizons. Hue is 10YR to 5YR, value is 2 or 3, and chroma is 0 to 2. Structure is coarse subangular blocky, or the material is massive.

The IICg horizon ranges from loam or silt loam to clay loam. Hue is 10YR or the color is neutral, value is 4 or 5, and chroma is 0 to 2. Structure is platy, or the material is massive.

Palms soils commonly are near Carlisle soils. They are similar to those soils but have thinner organic deposits. They are similar to Willette soils but have a coarser textured mineral soil substratum.

Pb—Palms muck. This soil is nearly level and formed in organic material overlying deposits of loamy mineral soil. It is in low depressions. Slopes are mostly less than 1 percent, and in a few small areas they are 2 percent.

Included with this soil in mapping are a few small areas of Carlisle soils that have thicker organic deposits than this Palms soil. Also included are a few areas, adjacent to active streams, of soils that have a thin mantle of silty alluvium overlying the organic material. A few small spots of Edwards soils are also included.

If drained, this soil is well suited to vegetables and root crops. In many areas installation of drainage either is not feasible or is difficult, because suitable outlets are lacking or the organic deposits are relatively thin. Where the organic deposits are mostly less than 36 inches thick, this soil has a relatively short productive life because of subsidence and oxidation of the organic material after drainage is installed. Where installation of drainage is practical, tile drains function well even in the mineral soil substratum. Soil blowing is a hazard, but it can be controlled by the use of manmade or vegetative windbreaks and by the use of cover crops. Compaction from heavy equipment can reduce permeability and thus adversely affect the performance of artificial drainage systems. If this soil is undrained, the native vegetation provides cover for wildlife but timber production is poor.

The prolonged high water table and instability of the organic material are severe limitations to most nonfarm uses of this soil. Some areas have potential for development of wetland wildlife habitat, for example, waterfowl nesting sites. Capability subclass IVw.

Palmyra series

The Palmyra series consists of deep, well drained and somewhat excessively drained soils. These soils formed in glaciofluvial deposits of sand and gravel derived from limestone, sandstone, and shale. They are nearly level to very steep and are on valley terraces, kame moraines, and old alluvial fans.

In a representative profile the surface layer is dark brown gravelly loam 9 inches thick. The subsurface layer extends to a depth of 16 inches and is brown gravelly loam that has some reddish brown material. The subsoil is reddish brown and dark reddish brown gravelly loam 17 inches thick. The substratum to a depth of 60 inches, is brown and dark brown, stratified sand and gravel.

The seasonal high water table generally is at a depth of more than 6 feet. Permeability is moderate in the surface layer and subsoil and very rapid in the substratum. Roots readily extend to the top of the calcareous substratum, and some taproots extend more deeply. Available water capacity is moderate. These soils warm quickly in spring. The natural supply of nitrogen is medium, supply of available phosphorus is low, and content of available potassium is medium. The natural content of lime is medium to high.

Many areas of these soils are used for cultivated crops and hay. More sloping areas generally are used for pasture and trees. Slope is a limitation to nonfarm uses that require good drainage.

Representative profile of Palmyra gravelly loam, undulating, in a cornfield 50 feet east of Camp Road and 0.2 mile north of U.S. Route 20 in the town of Madison:

Ap—0 to 9 inches; dark brown (7.5YR 4/2) gravelly loam rubbed; weak medium granular structure; friable; many fine roots; 25 percent coarse fragments; slightly acid; abrupt smooth boundary.

A&B—9 to 16 inches; brown (7.5YR 5/4) gravelly loam; weak fine and medium subangular blocky structure; very friable; many fine pores; 25 percent reddish brown (5YR 5/3) ped interiors that have patchy clay linings in pores; few vertical macropores filled with dark brown (7.5YR 4/2) material that has a high organic-matter content; 30 percent coarse fragments; slightly acid; gradual wavy boundary.

B&A—16 to 20 inches; reddish brown (5YR 4/3) gravelly loam; weak medium subangular blocky structure; friable; many fine roots; common fine pores; clay linings on pores in ped interiors; leached brown

(10YR 5/3) loam coatings, light gray (10YR 7/2) dry, 1 millimeter thick or more on faces of peds; 30 percent coarse fragments; slightly acid; gradual wavy boundary.

B2t—20 to 33 inches; dark reddish brown (5YR 3/3) gravelly heavy loam; weak medium subangular blocky structure; friable and slightly sticky; common fine roots; common fine pores; clay linings in pores; thick patchy clay films on faces of peds and bridging some sand grains; thin clay films on some coarse fragments; 30 percent coarse fragments; neutral; abrupt irregular boundary.

IIC—33 to 60 inches; brown (10YR 5/3) and dark brown (7.5YR 4/2) stratified sand and gravel; single grain; very friable; few clay films on coarse fragments in upper part; 60 percent coarse fragments; strongly calcareous; moderately alkaline.

The solum is 15 to 42 inches thick. Depth to carbonates ranges from slightly less than 15 inches to 42 inches. Tonguing of the B horizon into the IIC horizon accounts for the wide range in solum thickness. Depth to bedrock is more than 8 feet. Coarse fragments are mainly gravel and cobbles of limestone, sandstone, and shale. They make up 15 to 35 percent, by volume, of the solum and 40 to 65 percent of the substratum. Reaction is medium acid to neutral in the upper part of the solum and slightly acid to mildly alkaline in the lower part of the solum.

Some areas have an A1 horizon. The Ap or A1 horizon is gravelly loam, gravelly silt loam, or gravelly fine sandy loam. The A1 or Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2. Consistence is friable or very friable.

The A&B and B&A horizons are loam or fine sandy loam and include their gravelly analogues. The A portion of these horizons has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 to 4. The B portion has hue of 10YR to 5YR, value of 3 or 4, and chroma of 2 to 4. The B material is firmer and darker than the A material and makes up 10 to 40 percent of the A&B horizon. The A&B horizon is lacking between tongues in some places.

The B2t horizon ranges from gravelly fine sandy loam to gravelly sandy clay loam, and subhorizons in some places are gravelly light clay loam. Color is similar to that of the B portion of the B&A horizon. Structure is weak or moderate subangular blocky. Consistence is friable or firm.

The IIC horizon is mainly very gravelly sand that commonly is stratified and has a variable content of cobbles.

Palmyra soils form a drainage sequence with the moderately well drained Phelps soils, the somewhat poorly drained and poorly drained Fredon soils, and the very poorly drained Halsey soils. They are similar to Howard soils but have fewer coarse fragments in the subsoil than those soils.

PgA—Palmyra gravelly loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. It is on high terraces in many of the major valleys and on outwash plains.

Included with this soil in mapping are a few areas of soils that have more than 35 percent coarse fragments in the subsoil. Moderately well drained Phelps soils and somewhat poorly drained and poorly drained Fredon soils in a few small depressions are also included, and the more prominent areas of these included soils are indicated on the soil maps by the symbol for a wet spot.

This soil is well suited to cultivated crops and hay and pasture crops. Early season crops and deep-rooted crops, for example, alfalfa, grow especially well. Little or no moisture is lost through runoff, but droughtiness is a slight problem in midsummer in areas where the coarse textured substratum is within 25 inches of the surface. This soil is easy to till, but coarse fragments hinder some precision tillage operations and cause excessive wear to machinery. Minimum tillage can be used effectively on this soil.

The presence of coarse fragments is a limitation to the use of this soil for nonfarm purposes. Many areas have potential for residential development. Because permeability is very rapid in the substratum, there is a hazard of pollution of ground water from septic effluent or other waste. Capability class I.

PgB—Palmyra gravelly loam, undulating. This soil has the profile described as representative of the series. Slopes are mostly complex and range from 3 to 8 percent.

Included with this soil in mapping are a few areas of soils that have more than 35 percent coarse fragments in the subsoil. Somewhat poorly drained and poorly drained Fredon soils in a few very small, deep depressions and a few areas of nearly level Palmyra soil are also included.

This soil is suited to cultivated crops and hay and pasture crops. Early season crops and deep-rooted crops, for example, alfalfa, grow especially well. The hazard of erosion is slight in cultivated areas that are unprotected. Droughtiness is a slight problem in midsummer in areas where the coarse textured substratum is within 25 inches of the surface. Coarse fragments slightly hinder precision tillage operations. Use of cover crops and minimum tillage help to maintain good soil tilth and to reduce erosion.

Gentle slopes and the presence of coarse fragments are limitations to nonfarm uses that require good drainage. Some areas have excellent potential as homesites. Capability subclass IIe.

PgC—Palmyra gravelly loam, rolling. This soil has a profile similar to the one described as representative of the series, except the depth to the underlying substratum is slightly less. This soil is on moraines that have complex slopes and on scarp faces of valley terraces. Slopes range from 8 to 15 percent.

Included with this soil in mapping are a few areas of soils that have more than 35 percent coarse fragments in the subsoil. Very poorly drained Halsey and Palms soils in a few small, deep depressions are also included and are indicated on the soil maps by the symbol for a wet spot.

This soil is suited to some cultivated crops and to hay and pasture. The hazard of erosion is moderate in cultivated areas. Minimum tillage, use of cover crops, including sod crops in the cropping system, and cross slope tillage where practical are measures that reduce erosion, conserve moisture, and promote good soil tilth. Droughtiness is a slightly greater problem on this soil than on less sloping phases of Palmyra soils. Slope and coarse fragments hinder some tillage operations.

Slope is the main limitation to nonfarm uses. Some areas have potential for homesites, but the site should be selected carefully. Capability subclass IIIe.

PgD—Palmyra gravelly loam, hilly. This soil has a profile similar to the one described as representative of the series, except the surface layer and subsoil are thinner. Most areas of this soil are on moraines that have complex slopes. A few areas are on terrace fronts. Slopes range from 15 to 25 percent.

Included with this soil in mapping are a few areas of soils that have more than 35 percent coarse fragments in

the subsoil. Very poorly drained Halsey and Palms soils in a few very small deep depressions are also included and are indicated on the soil maps by the symbol for a wet spot.

This soil is best suited to pasture and trees. Cultivated crops can be grown, but tillage is difficult and the hazard of erosion is severe because of the moderately steep slopes. Because slopes are complex, some practices to control erosion are not feasible. However, minimum tillage, use of cover crops, return of crop residue to the soils, and including a high proportion of sod crops in the cropping system should be part of management. Droughtiness in midsummer is a slightly greater problem on this soil than on less sloping Palmyra soils.

Slope is a severe limitation to most nonfarm uses. Some areas have good potential as a source of sand and gravel. Capability IVe.

PhB—Palmyra gravelly silt loam, fan, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, except it has a surface layer of gravelly silt loam and has free lime closer to the surface. This soil is on slightly convex alluvial fans that were built by high gradient side streams where they enter main valleys. It is subject to rare flooding. Slopes are broad and simple.

Included with this soil in mapping are some large areas of soils that have reprecipitated calcium carbonate (free lime) in the surface layer and upper part of the subsoil and a few areas of soils that lack an increase in clay content in the subsoil. Moderately well drained Phelps soils and somewhat poorly drained Fredon soils in a few slight depressions and on the lower part of some alluvial fans are also included.

This soil is well suited to cultivated crops and hay and pasture crops. Row crops, for example, corn, grow especially well. The hazard of erosion is slight. Minimum tillage and the use of cover crops are practices that help to reduce erosion. Cross slope tillage can be used in most areas. The need for applying lime is very low. Coarse fragments hinder some precision tillage operations in places. This soil generally is less droughty than the undulating Palmyra soil.

Although flooding is rare, this soil should not be used for residential or industrial developments. Slope and the presence of coarse fragments are limitations to some nonfarm uses. Capability subclass IIe.

PKC—Palmyra-Arkport complex, rolling. This map unit consists of about 50 percent Palmyra soil and 40 percent Arkport soil. These soils form such an intricate pattern on the landscape that it was not practical to map them separately at the scale used. The surface layer is gravelly loam, fine sandy loam, or gravelly fine sandy loam. These soils have a profile similar to the one described as representative of the series, except the Palmyra soil has a surface layer of gravelly fine sandy loam in some places. Slopes range from 8 to 15 percent and are mostly short and complex.

Included with these soils in mapping are somewhat poorly drained and poorly drained Fredon soils, somewhat poorly drained Minoa soils, and very poorly drained Halsey soils in a few small drainageways and in depressions. In the southern part of the county, a few areas of Howard soils are also included.

These soils are suited to some cultivated crops, hay and pasture crops, and trees. The moderate to severe hazard of erosion is the principal management concern. Because the slopes are complex, cross slope tillage and stripcropping generally are not practical. However, minimum tillage and use of cover crops are effective conservation practices. The cropping system should consist mainly of sod crops. Erosion is a slightly greater hazard on these soils than on Palmyra gravelly loam, rolling, but these soils are less droughty.

Slope is the main limitation to most nonfarm uses. Some areas have potential as a source of sand or gravel (fig. 10). Capability subclass IIIe.

PKD—Palmyra-Arkport complex, hilly. This map unit consists of about 50 percent Palmyra soil and 40 percent Arkport soil. These soils form such an intricate pattern on the landscape that it was not practical to map them separately at the scale used. The surface layer is gravelly loam, fine sandy loam, or gravelly fine sandy loam. These soils have a profile similar to the one described as representative of the series, except the depth to the underlying substratum is less. In addition, the Palmyra soil has a surface layer of gravelly fine sandy loam in some places. Slopes range from 15 to 25 percent and are mostly short and complex.

Included with these soils in mapping are very poorly drained Halsey and Palms soils in small, deep depressions. Also included are some areas of Howard soils in the southern part of the county and a few areas of severely eroded soils.

These soils are suited to hay and pasture crops and trees. Cultivated crops can also be grown, but the hazard of erosion is severe, especially in sandy areas, and the operation of tillage equipment is somewhat difficult. Some practices to control erosion, for example, contour farming, are difficult to use because of the complex slopes. The cropping system should consist dominantly of sod crops, and a plant cover should be maintained. Although droughtiness is a problem in midsummer, it is less serious than on Palmyra gravelly loam, hilly. The hazard of soil blowing is slight.

Moderately steep slopes are a severe limitation to most nonfarm uses of these soils. Many areas of these soils have potential as a source of sand or gravel. Capability subclass IVe.

PKE—Palmyra-Arkport complex, steep. This map unit consists of about 50 percent Palmyra soil and 40 percent Arkport soil. These soils form such an intricate pattern on the landscape that it was not practical to map them separately at the scale used. The surface layer is gravelly fine sandy loam, fine sandy loam, or gravelly loam. These soils have a profile similar to the one

described as representative of the series, except the surface layer and subsoil are thinner. In addition, the Palmyra soil has a surface layer of gravelly fine sandy loam in some places. Slopes range from 25 to 45 percent and are simple or complex.

Included with these soils in mapping are very poorly drained Halsey soils in small, deep depressions. A few areas of Howard soils, a silty soil that is similar to Collamer soils but is well drained, and a few areas of severely eroded and very severely eroded soils are also included.

These soils are best suited to permanent pasture or trees. Use of machinery is extremely difficult and hazardous because of the steep slopes. Runoff is rapid, and the hazard of erosion is very severe especially in unprotected sandy areas. Droughtiness is a problem in midsummer. Deep-rooted, drought-tolerant pasture plants grow best. The hazard of soil blowing is slight.

Steep slopes are a severe limitation to most nonfarm uses of these soils. Some areas have potential for development of wildlife habitat, as a source of sand and gravel, or as an open space corridor. Capability subclass VIe.

PME—Palmyra and Howard soils, steep. Many areas of this map unit consist entirely of Palmyra soil, some areas consist entirely of Howard soil, and a few areas have both soils. These soils have a profile similar to the one described as representative of the series, except the depth to the underlying substratum is less. The surface layer is gravelly loam or gravelly silt loam. Slopes range from 25 to 45 percent and are simple or complex.

Included with these soils in mapping are a few areas of severely eroded soils. Also included are very poorly drained Halsey and Palms scils in a few small, deep depressions in moraine areas where slopes are complex. A few seep spots at the base of slopes are also included.

These soils are suited to permanent pasture and trees. The hazard of erosion is severe unless the soils are protected by a permanent cover of vegetation. The operation of farm machinery that has a high center of gravity is difficult and hazardous because of the steep slopes. Because runoff is rapid and available water capacity is reduced, these soils are droughty in summer. Pasture generally is poor in quality because of droughtiness. The operation of equipment is less hazardous on these soils than on the sandier Palmyra-Arkport complex, steep.

The steep slopes are a severe limitation to most nonfarm uses of these soils. Some areas have potential as a source of gravel or for development of wildlife habitat. Capability subclass VIe.

PMF—Palmyra and Howard soils, very steep. Some areas of this map unit consist entirely of Palmyra soil, some areas consist entirely of Howard soil, and some areas have both soils. These soils have a profile similar to the one described as representative of the series, except the surface layer and subsoil are thinner. The surface layer is gravelly loam or gravelly silt loam. Slopes range from 45 to 70 percent and are mostly plane and simple.

Included with these soils in mapping are a few areas of severely eroded and very severely eroded soils. Poorly drained soils that are similar to Halsey soils and that are in seep spots and springs on a few foot slopes are also included.

These soils are best suited to trees. Pasture is poor in quality because of droughtiness in summer and the difficulty in reseeding and in applying fertilizer. Slopes are too steep for the safe operation of farm machinery. Runoff is very rapid, and the hazard of erosion is very severe in exposed areas, for example, areas where timber has been clearcut.

Very steep slopes are a severe limitation to nonfarm uses. Most areas of these soils are suitable for use as open space corridors. In some areas shrubs and trees can be hand planted to improve habitat for wildlife. Capability subclass VIIe.

Phelps series

The Phelps series consists of deep, moderately well drained soils. These soils formed in glaciofluvial (water-laid) deposits of sand and gravel derived from limestone, sandstone, and shale. They are nearly level and gently sloping and are on stream terraces, outwash plains, and remnant beach ridges on the lake plain and in valley bottoms.

In a representative profile the surface layer is very dark grayish brown gravelly silt loam 11 inches thick. The upper part of the subsoil is mottled, dark brown gravelly loam 4 inches thick that has thin coatings of leached brown material; the middle part is friable, mottled, reddish brown gravelly heavy loam 8 inches thick; and the lower part is very friable, mottled, brown gravelly loam 4 inches thick. The substratum, to a depth of 60 inches, is dark brown and brown very gravelly loamy sand.

A temporary seasonal high water table is in the subsoil for brief periods early in spring and in other excessively wet periods. Permeability is moderate in the surface layer and subsoil and moderately rapid or rapid in the substratum. Rooting depth is mainly confined to the upper 24 inches of soil. As the water table drops, however, some roots penetrate the top of the substratum. Available water capacity is moderate. The natural supply of nitrogen is medium, supply of phosphorus is low, and content of available potassium is medium. The natural content of lime is medium to high.

Many areas of these soils are used for cultivated crops and hay associated with dairying. Some areas are used for pasture or trees. Temporary seasonal wetness is the main limitation to nonfarm uses of these soils.

Representative profile of Phelps gravelly silt loam, 0 to 3 percent slopes, in a grassy field 150 yards southwest of Die-Tooling Company plant, 300 yards west of Court Street, and 0.5 mile north of State Route 5 in the town of Lenox:

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) gravelly silt loam rubbed, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine roots; 15 percent coarse fragments; neutral; abrupt smooth boundary.

B&A—11 to 15 inches; dark brown (10YR 4/3) gravelly loam; common fine faint brown (7.5YR 5/2) and distinct yellowish brown (10YR 5/4) mottles in lower part; moderate fine subangular blocky structure; friable; many fine roots; many fine pores; clay linings in pores in ped interiors; brown (7.5YR 5/2) coatings 1 to 2 millimeters thick on faces of peds and many skeletons lighter in color; few dark brown (7.5YR 3/2) organic stains in vertical macropores; 20 percent hard coarse fragments, and few disintegrating olive shale chips; neutral; clear wavy boundary.

B2t—15 to 23 inches; reddish brown (5YR 4/3) gravelly heavy loam; common fine distinct brown (7.5YR 5/2), strong brown (7.5YR 5/6), and faint reddish brown (5YR 4/4) mottles; moderate medium subangular blocky structure; friable; common fine roots; many fine pores; continuous clay linings in pores; thick patchy clay films on faces of peds; 30 percent hard coarse fragments, and few disintegrating olive shale chips; neutral; gradual wavy boundary.

B3—23 to 27 inches; brown (7.5YR 5/2) gravelly loam; common medium distinct reddish brown (5YR 4/4) and faint brown (7.5YR 5/4) mottles; very weak medium platy structure; very friable when removed; few fine roots in upper part; common fine pores; few thin clay linings in pores; 30 percent hard coarse fragments, and common disintegrating olive shale fragments and few limestone ghosts; neutral grading to mildly alkaline; clear wavy boundary.

IIC—27 to 60 inches; dark brown and brown (7.5YR 4/2 and 5/2) very gravelly loamy sand grading to very gravelly sand; single grain; very friable; 65 percent coarse fragments; strongly calcareous; moderately alkaline.

The solum is 24 to 35 inches thick. Depth to carbonates is similar but the range in depth is slightly wider. Depth to bedrock is more than 5 feet. Coarse fragments are mainly gravel and cobbles of limestone, sandstone, and shale. They make up 5 to 35 percent, by volume, of the solum and 35 to 65 percent of the substratum. Reaction is medium acid to neutral in the solum and commonly is mildly alkaline in the extreme lower part.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2. Some areas have a thin A2 horizon, depending on depth of plowing.

The B&A horizon ranges from loam to silt loam. The A portion of this horizon is slightly coarser in texture, and gravelly analogues are common. The B portion has hue of 5YR to 10YR, value mainly of 4, and chroma of 3 or 4. The A portion has similar hue but has value mainly of 5 and chroma of 2 or 3. Mottles that have higher and lower chroma than that of the matrix commonly are present.

The Bt horizon ranges from loam to light clay loam and generally includes gravelly analogues. Color is similar to that of the B portion of the B&A horizon. Mottles of high and low chroma are common to many. Structure is weak or moderate subangular blocky.

The B3 horizon has slightly coarser texture than the Bt horizon.

The C horizon is sand or loamy sand and includes very gravelly analogues. Stratification is common.

Phelps soils form a drainage sequence with the well drained and somewhat excessively drained Palmyra soils, the somewhat poorly drained and poorly drained Fredon soils and the very poorly drained Halsey soils. They also form a drainage sequence with the well drained and somewhat excessively drained Howard soils and the well drained Wampsville soils.

PpA—Phelps gravelly silt loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. It commonly is on low terraces and outwash plains and receives runoff from adjacent soils.

Included with this soil in mapping are a few small areas of somewhat poorly drained and poorly drained Fredon soils in slight depressions and well drained and somewhat excessively drained Palmyra soils on slight rises. A few areas of soils that have more than 35 percent coarse fragments in the subsoil and a few small areas of soils that have a thin silty mantle are also included.

This soil is suited to cultivated crops, hay and pasture, and trees. In some years temporary wetness briefly delays tillage operations early in spring. Randomly placed drains for wet spots and interceptor drains benefit many areas. Availability of suitable outlets commonly depends on the depth of the adjacent stream channel. Coarse fragments hinder some precision tillage operations and cause excessive wear to machinery. Use of cover crops and minimum tillage help to maintain good soil tilth.

Temporary seasonal wetness and the presence of coarse fragments are limitations to some nonfarm uses. Some areas have potential as homesites, but drains around basements should be carefully designed. Capability subclass IIw.

PpB—Phelps gravelly silt loam, 3 to 8 percent slopes. This soil has a profile similar to the one described as representative of the series, except mottles are less distinct and fewer in the upper part of the subsoil. This soil commonly receives a moderate amount of runoff from higher adjacent soils. In some areas slopes are complex.

Included with this soil in mapping are a few small areas of somewhat poorly drained and poorly drained Fredon soils along drainageways and in depressions. A few areas of nearly level Phelps soils and some areas of soils that have more than 35 percent coarse fragments in the subsoil are also included.

This soil is suited to cultivated crops, hay and pasture, and trees. Interceptor drains generally function well, and in many areas they allow tillage earlier in spring. Erosion is a hazard in cultivated areas that are unprotected. Coarse fragments hinder some precision tillage operations and cause excessive wear to equipment. Cross slope tillage, minimum tillage, and use of cover crops reduce erosion and help to conserve moisture.

Temporary seasonal wetness, slope, and the presence of coarse fragments are limitations to some nonfarm uses. Some areas have potential for residential development, but artificial drainage is needed. Capability subclass IIe.

Raynham series

The Raynham series consists of deep, somewhat poorly drained and poorly drained soils. These soils formed in glaciolacustrine and deltaic deposits that are mainly coarse silt and very fine sand. They are nearly level and are on the lake plain and in some of the major valleys.

In a representative profile the surface layer is dark grayish brown silt loam 9 inches thick. The subsoil is friable, mottled, yellowish brown and grayish brown light silt loam 24 inches thick. The substratum is firm, brown silt loam with varves of very fine sand to a depth of 41 inches and is grayish brown very fine sandy loam with varves of loamy fine sand and silt to a depth of 58 inches.

A seasonal high water table is in the upper part of the subsoil in spring and in other excessively wet periods. Depth to the water table generally coincides with the level of ground water, but at times the water table is perched above the substratum. Permeability is moderate in the surface layer, moderate or moderately slow in the subsoil, and slow in the substratum. Rooting depth is mostly confined to the upper part of the subsoil, but a few roots extend more deeply as the water table drops early in summer. In drained areas root penetration is good. Available water capacity is high. The natural content of nitrogen is medium to high, but nitrogen is released slowly to plants in spring when the soils are damp and cold. The natural supply of phosphorus is low, and content of available potassium is medium to low. The natural content of lime is medium.

Most areas of these soils are used for hay and pasture crops or trees. Some areas are drained and are used for cultivated crops. Seasonal wetness and slow permeability in the substratum are limitations to many nonfarm uses of these soils.

Representative profile of Raynham silt loam, in a grassy meadow 100 feet north of New Boston Road and 1 mile east of Fly Road in the town of Sullivan:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, rubbed; weak medium granular structure; friable; many fine roots; slightly acid; abrupt wavy boundary.

B21—9 to 16 inches; yellowish brown (10YR 5/4) light silt loam; few fine faint brown (7.5YR 5/2) and strong brown (7.5YR 5/6) mottles; weak medium platy structure; friable and slightly brittle; common roots; many medium and few large pores; slightly acid; abrupt wavy boundary.

B22—16 to 33 inches; grayish brown (10YR 5/2) light silt loam; many medium and coarse distinct yellowish brown (10YR 5/6) mottles; weak medium platy structure; friable and slightly hard; few roots in upper part; common medium pores; slightly acid; abrupt wavy boundary.

C1—33 to 41 inches; brown (7.5YR 5/2) silt loam with varves of very fine sand; many medium and coarse distinct yellowish brown (10YR 5/6) mottles; weak thick platy structure; firm; few pores; neutral; abrupt wavy boundary.

IIC2—41 to 58 inches; grayish brown (10YR 5/2) very fine sandy loam with varves of loamy fine sand and silt; common medium distinct yellowish brown (10YR 5/4) mottles; weak thin platy structure; friable; few pores; mildly alkaline.

The solum is 20 to 38 inches thick. Depth to bedrock is more than 5 feet. Depth to carbonates and to strongly contrasting deposits is more than 40 inches. Coarse fragments are very few or are absent in the solum. Reaction increases with increasing depth. It is strongly acid to slightly acid in the solum and medium acid to mildly alkaline in the lower part of the substratum.

Some areas have an A1 horizon. The Ap or A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2. Structure is weak or moderate granular. Consistence is friable or very friable.

The B horizon is mainly light silt loam or very fine sandy loam. Clay content is less than 18 percent. Hue is dominantly 10YR, but is 2.5YR in some places. The B horizon has value of 4 to 6 and chroma mainly of 2, but some subhorizons have chroma of 3 or higher. Structure is weak or moderate platy, subangular blocky, or granular. Consistence is friable or firm.

The C horizon commonly is silt, silt loam, or very fine sandy loam and commonly is varved with loamy fine sand or fine sand. It has color similar to that of the B horizon, except in some places it has hue of 7.5YR and chroma of 1. Consistence is friable but commonly is firm.

Raynham soils are lower in clay content than somewhat poorly drained, silty Niagara soils. They commonly are near Minoa soils. They are similar to Minoa soils but are higher in silt content.

Ra—Raynham silt loam. This soil is nearly level and formed mostly in silty glacial lake deposits. It is mainly somewhat poorly drained, but in some areas it is poorly drained. Slopes range from 0 to 3 percent.

Included with this soil in mapping are small areas of somewhat poorly drained, sandier Minoa soils. Also included are poorly drained and very poorly drained, slightly finer textured Canandaigua soils in a few small depressions. A few areas of a soil that is similar to this Raynham soil but is moderately deep to glacial till or gravelly glacial outwash are also included.

This soil is suited to hay and pasture crops and trees. In drained areas it is suited to cultivated crops and some vegetables. Drainage is feasible in most areas if suitable outlets are available. In some places tile joints need to be wrapped or covered with filters to prevent very fine sand from plugging the drains. If drained, this soil is easy to till and crusting and clodding generally are not problems. Use of cover crops, minimum tillage, and including sod crops in the cropping system help to maintain good soil tilth.

Seasonal wetness and slow permeability in the substratum are the main limitations to the use of this soil for nonfarm purposes. Low bearing strength and instability of cuts are limitations to some uses. Capability subclass IIIw.

Schoharie series

The Schoharie series consists of deep, moderately well drained and well drained soils. These soils formed in reddish glaciolacustrine (lake-laid) deposits that are mainly clay and silt. They are gently sloping to steep and are on the lake plain and in valleys that formerly were glacial lakes.

In a representative profile the surface layer is dark brown silt loam 7 inches thick. The upper part of the subsoil is firm, reddish brown silty clay loam 7 inches thick that has thin coatings of leached, reddish brown heavy silt loam. The lower part of the subsoil is mottled, reddish brown, firm, and very sticky silty clay 11 inches thick. The substratum is very firm, reddish brown silty clay to a depth of 38 inches and is weak red silty clay with lenses of silt to a depth of 60 inches.

A temporary seasonal high water table is in the lower part of the subsoil early in spring. It commonly is perched above the dense substratum. Permeability is slow or very slow in the subsoil and substratum. Rooting depth is only slightly restricted by the seasonal high water table, but the fine textured subsoil generally is a poor medium for root development. Available water capacity is moderate to high. The natural supply of nitrogen is medium. The natural content of available phosphorus is low to medium, and content of available potassium is high. The natural content of lime is medium to high.

These soils are used for pasture and for crops associated with dairy farming. In a few carefully managed areas they are used for cash crops and vegetables. Slow and very slow permeability and temporary seasonal wetness are the main limitations to most nonfarm uses of these soils.

Representative profile of Schoharie silt loam, 3 to 8 percent slopes, in a pasture 80 feet west of Middle Road and 1.4 miles north of Green Road in the town of Stockbridge:

Ap—0 to 7 inches; dark brown (7.5YR 4/2) silt loam; moderate medium granular structure; friable; many fine roots; 2 percent coarse fragments; neutral; abrupt smooth boundary.

B&A—7 to 14 inches; reddish brown (5YR 4/3) silty clay loam; common medium faint dark brown (7.5YR 4/4) mottles in the lower part; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; common fine roots; common fine pores; clay linings in pores in ped interiors; 30 percent reddish brown (5YR 5/3) coatings of heavy silt loam; light reddish brown (5YR 6/3) dry, on vertical faces of peds; few dark brown (7.5YR 3/2) vertical wormcasts; 1 percent coarse fragments; slightly acid; gradual wavy boundary.

B2t—14 to 25 inches; reddish brown (5YR 4/3) silty clay; common fine faint dark brown (7.5YR 4/4) mottles and few olive (5Y 5/3) threadlike mottles; moderate very coarse prismatic structure parting to moderate medium and coarse blocky; firm, very sticky and plastic; few fine roots; few fine pores; thick patchy clay films on faces of peds; continuous clay linings in pores; weakly calcareous in lower 2 inches; neutral grading to mildy alkaline; clear wavy boundary.

C1—25 to 38 inches; reddish brown (5YR 5/3) silty clay; many medium faint reddish brown (5YR 5/4) mottles and common medium distinct gray (5YR 5/1) threadlike mottles; massive; very firm, very sticky and plastic; few fine pores; common patches of pinkish gray (5YR 6/2) segregated lime; strongly calcareous; moderately alkaline; gradual wavy boundary.

C2—38 to 60 inches; weak red (2.5YR 4/2) silty clay with thin lens of silt; common medium distinct gray (5YR 6/1) and reddish brown (5YR 5/4) mottles; weak medium platy structure; very firm and very sticky; patches of pale red (2.5YR 6/2) segregated lime; strongly calcareous; moderately alkaline.

The solum is 20 to 35 inches thick, and depth to carbonates ranges from 20 to 33 inches. Depth to bedrock is more than 5 feet. Coarse fragments generally are absent, but gravel fragments make up as much as 3 percent of some subhorizons. Reaction is medium acid to neutral in the upper part of the solum and neutral or mildly alkaline in the lower part of the solum.

The Ap horizon is silt loam or silty clay loam. It has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. Some areas have an A1 horizon that is slightly darker in color than the Ap horizon.

Ped interiors in the B&A horizon are silty clay loam or silty clay. The B&A horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. Ped exteriors are higher in value and slightly coarser in texture than ped interiors.

The Bt horizon ranges from heavy silty clay loam to silty clay or clay. It has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 3 or 4. Structure generally is moderate or strong blocky and is prismatic in some places. Consistence is firm or very firm. High chroma mottles are in some profiles.

The C horizon is silty clay or is varved clay that has lenses of silty material. Consistence is firm or very firm.

Schoharie soils are in a drainage sequence with the somewhat poorly drained Odessa soils, the poorly drained and very poorly drained Lakemont soils, and the very poorly drained Fonda soils. They formed in parent material similar to that in which those soils formed. Schoharie soils commonly are near Cazenovia soils. They are finer textured than Cazenovia soils and, unlike those soils, do not have coarse fragments.

ScB—Schoharie silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It is mainly moderately well drained. Slopes are slightly convex and commonly are undulating. This soil receives little or no runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of somewhat poorly drained Odessa soils in shallow drainageways and in nearly level spots. Also included are a few areas of soils that have a thin gravelly mantle. These areas are identified on the soil maps by the symbol for a gravelly spot. A few small areas of eroded soils that have a surface layer of silty clay loam are also included.

This soil is suited to cultivated crops, hay and pasture, and trees. It is suited to some vegetable crops if good soil tilth is maintained. Because this soil absorbs water slowly, tillage operations are slightly delayed in spring. Randomly placed drains for wet spots improve many fields. Controlling runoff and erosion and preventing crusting and clodding are the principal management problems. Including deep-rooted sod crops in the cropping system, using cover crops, minimum tillage, and tilling at the proper moisture content should be part of management.

This soil is suited to some nonfarm uses. However, slow and very slow permeability, temporary seasonal wetness, and instability of the fine textured subsoil and substratum are severe limitations to the use of this soil for many nonfarm purposes. Capability subclass IIe.

SdC—Schoharie silty clay loam, rolling. This soil has a profile similar to the one described as representative of the series, except the surface layer is finer textured. Slopes are mostly slightly convex, are dissected in places by drainageways, and range from 8 to 15 percent. In some areas slopes are plane and simple. This soil receives a variable amount of runoff from higher adjacent soils.

Included with this soil in mapping are some large areas of severely eroded soils and a few areas of somewhat poorly drained Odessa soils in shallow drainageways. The lowest parts of drainageways and sags commonly have silty deposits of eroded material. Some areas of soils that have a surface layer of silt loam and a few small areas of soils that are similar to this Schoharie soils but have a gravelly mantle are also included.

This soil is suited to cultivated crops. Because of the severe hazard of erosion and the poor condition of the surface layer, in some places it is better suited to hay and pasture crops and trees. Available water capacity is somewhat lower than on the less sloping Schoharie soils. This soil should be tilled at the proper moisture content to prepare a good seedbed and to reduce clodding. Management practices should include contour tillage, use of cover crops, return of crop residue to the soil and planting directly onto crop residue where practical.

Slow or very slow permeability, temporary seasonal wetness, instability, and slope are limitations to many nonfarm uses. Special precautions are needed to protect exposed slopes in construction areas from erosion and gullying. Capability subclass IIIe.

SdD3—Schoharie silty clay loam, hilly, severely eroded. This soil has a profile similar to the one described as representative of the series, except the surface is finer textured because of erosion. It is mostly well drained. Slopes range from 15 to 25 percent, are slightly convex to smooth, and are dissected by moderately deep drainageways in many areas. In some areas slopes are plane and simple. This soil commonly receives runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of somewhat poorly drained Odessa soils in narrow drainageways. Also included are a few areas of uneroded soils that remain mostly in woodland and have a surface layer of silt loam. A few small areas of soils that have a mantle of coarser textured deposits similar to those in Cazenovia soils are also included.

This soil is not suited to cultivated crops. It is suited to pasture and trees. The hazard of further erosion, including gullying, is severe on this soil unless properly managed. Tillage operations are difficult because of steepness of slope, poor soil tilth, and the presence of rills and gullies. Moderately deep, eroded drainage channels in some areas are uncrossable by machinery. Droughtiness is a problem in midsummer because much rainfall is lost through runoff. As a result, pasture is poor in quality. Generally, this soil should be tilled only for reseeding of pasture.

Slope, slow or very slow permeability, and instability of the substratum are the main limitations to many nonfarm uses. Cuts on toeslopes increase the hazard of slips or slumps. Capability subclass VIe.

SEE—Schoharie-Cazenovia complex, steep. This map unit consists of about 50 percent Schoharie soil and 40 percent Cazenovia soil. These soils form such an intricate pattern on the landscape that it was not practical to map them separately at the scale used. These soils have a profile similar to the one described as representative of the series, except the surface layer of the Schoharie soil is mainly silty clay loam. Because of erosion, much of the finer textured subsoil material has been incorporated into the surface layer. Slopes range from 25 to 50 percent and are dissected in many areas by deep drainageways.

Included with these soils in mapping are a few areas that consist almost entirely of Schoharie soil or of Cazenovia soil. Also included are a few areas of steeper soils mostly along dissecting drainageways. A few small areas of Aurora and Lairdsville soils, which are moderately deep to bedrock, are also included.

The soils in this map unit are suited to pasture and trees. Pasture generally is poor in quality because of droughtiness and the difficulty in applying fertilizer. Because of slope, the hazard of erosion is very severe and the operation of equipment is extremely difficult. Water is absorbed slowly, and much moisture is lost through runoff. A dense cover of plants should be maintained continuously.

Slope, and slow or very slow permeability are limitations to the use of these soils for most nonfarm purposes. Roads and buildings should not be located near foot slopes that are subject to mass slips and slumps. Capability subclass VIIe.

Stockbridge series

The Stockbridge series consists of deep, well drained soils. These soils formed in glacial till and in congeliturbate deposits that have fragments of sandstone, siltstone, and limestone. They are gently sloping to moderately steep and are on the upland plateau and on valley sides.

In a representative profile the surface layer is dark brown channery silt loam 7 inches thick. The subsoil is friable, yellowish brown and brown channery loam 27 inches thick. The substratum, to a depth of 62 inches, is firm, mottled, dark brown and brown channery loam.

A seasonal high water table commonly is perched above the lower part of the substratum for very brief periods early in spring, especially in less sloping areas. Permeability is moderate in the surface layer and subsoil and slow in the substratum. Rooting depth generally is unrestricted, and some roots penetrate the upper part of the substratum. Available water capacity is moderate to high. The natural supply of nitrogen is medium, supply of phosphorus is low, and content of available potassium is medium. The content of lime is medium to low.

Most areas of Stockbridge soils are used for cultivated crops and hay and pasture crops. Some areas are idle or are used for trees. Slow permeability in the substratum and the presence of coarse fragments are limitations to nonfarm uses that require good drainage.

Representative profile of Stockbridge channery silt loam, 8 to 15 percent slopes, in a reforested area 20 feet south of Brook Road and 1/4 mile east of Hatch Lake Road in the town of Nelson:

Ap—0 to 7 inches; dark brown (10YR 3/3) channery silt loam, light brownish gray (10YR 6/2) dry; moderate fine and medium granular structure; friable; many fine and common medium roots; 15 percent coarse fragments; strongly acid; clear smooth boundary.

B21—7 to 15 inches; yellowish brown (10YR 5/4) channery light silt loam; weak medium subangular blocky structure; friable; many fine and few medium roots; many fine pores; thin grayish brown (10YR 5/2) layer in lower 2 inches; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B22—15 to 34 inches; brown (10YR 5/3) channery loam; weak medium subangular blocky structure; friable; common fine and few medium roots; common fine pores; few clay patches in pores; few skeletons on faces of peds; 30 percent coarse fragments; medium acid; gradual irregular boundary.

C1—34 to 47 inches; dark brown (10YR 4/3) channery loam with lens of silty material; few fine faint brown (7.5YR 4/4) mottles; weak thick platy structure; firm; common fine pores; few patchy clay films in pores and on some coarse fragments; 30 percent coarse fragments; slightly acid; gradual irregular boundary.

C2—47 to 62 inches; brown (10YR 4/3) channery heavy loam that has some grayish brown (2.5Y 5/2) material; few fine faint dark yellowish brown (10YR 4/4) and dark grayish brown (10YR 4/2) mottles; massive; firm; few pores; 34 percent coarse fragments; neutral.

The solum is 30 to 40 inches thick, and depth to carbonates is 45 to 80 inches. Depth to bedrock is more than 5 feet. Coarse fragments are of mixed lithology but are mainly sandstone and siltstone. They make up 5 to 30 percent, by volume, of the solum, and the percentage commonly in-

creases in the substratum. Reaction is very strongly acid to slightly acid in the solum and medium acid to neutral in the upper part of the substratum.

The Ap horizon is channery silt loam or gravelly silt loam. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The B horizon is loam or silt loam, and channery and gravelly analogues are common. The B horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. Structure is weak or moderate subangular blocky. Consistence is friable or firm.

The C horizon is loam or silt loam, and channery and gravelly analogues are common. The C horizon has hue of 10YR or 2.5YR, value of 4 or 5, and chroma of 2 or 3. Faint mottles are common. Structure is weak platy, or the material is massive. Consistence is firm or very firm.

Stockbridge soils commonly are near Bath, Howard, and Lansing soils. Stockbridge soils are similar to Bath soils but do not have a fragipan, which those soils have. The substratum in Stockbridge soils, unlike that in Howard soils, does not consist of well sorted, gravelly material. Stockbridge soils have drainage similar to that of Lansing soils but have a lower content of clay in the subsoil than those soils.

SgB—Stockbridge channery silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, except the surface layer and subsoil are slightly thicker. It is on convex hillsides and on the top of low, rounded hills. It receives little or no runoff from higher adjacent soils.

Included with this soil in mapping are soils that are similar to this Stockbridge soil but are moderately well drained and somewhat poorly drained; these included soils are in slight depressions and along field drainageways. Also included are a few small areas of Bath soils.

This soil is suited to some cultivated crops, hay and pasture, and trees. Row crops that are used in dairy farming grow well, but the lime requirement generally is high. The hazard of erosion is slight in cultivated areas that are unprotected. Contour tillage, use of cover crops, and minimum tillage are practices that help to control erosion, conserve moisture, and maintain good soil tilth. Coarse fragments slightly hinder precision tillage operations and cause excessive wear to machinery.

Slow permeability in the substratum and the presence of coarse fragments are limitations to some nonfarm uses. Many areas have excellent potential as homesites. Capability subclass IIe.

SgC—Stockbridge channery silt loam, 8 to 15 percent slopes. This sloping soil has the profile described as representative of the series. It is on hillsides. Slopes are convex and plane. This soil receives a small amount of runoff from higher adjacent soils. Many areas have north-facing slopes.

Included with this soil in mapping are small areas of Bath soils which have a fragipan. Also included are a few small areas of soils that are similar to this Stockbridge soil but are moderately well drained and somewhat poorly drained; these included soils are on foot slopes and along drainageways. A few areas of soils that have a friable, water-worked, gravelly substratum are also included.

This soil is suited to some cultivated crops, hay and pasture, and trees. Deep-rooted legumes grow well if an adequate amount of lime and fertilizer is applied. The hazard of erosion is moderate. Contour tillage, use of cover crops, and stripcropping where practical are practices that help to control erosion, conserve moisture in midsummer, and maintain good soil tilth. Coarse fragments hinder some precision tillage operations.

Slope, slow permeability in the substratum, and the presence of coarse fragments are limitations to some nonfarm uses. Homesites should be carefully selected. Capability subclass IIIe.

SgD—Stockbridge channery silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, except it has more coarse fragments in the surface layer and does not have mottles in the upper part of the substratum. It is on hillsides and valley sides. Slopes are slightly convex and plane. This soil receives a small to moderate amount of runoff from higher adjacent soils. Many areas are moderately dissected by shallow drainageways and by a few deep drainageways.

Included with this soil in mapping are a few areas of steep soils and of Bath soils, which have a fragipan. Also included are a few small areas of severely eroded soils and a few areas of soils that are similar to this Stockbridge soil but are slightly less well drained.

This soil is suited to hay and pasture crops and trees. It also is suited to cultivated crops, but the operation of machinery is difficult and hazardous and the hazard of erosion is severe. If cultivated crops are grown, a maximum of conservation practices should be used and the cropping system should consist mainly of sod crops. Because of rapid runoff, droughtiness is a problem in midsummer. Coarse fragments hinder some precision tillage operations.

Slope is the main limitation to most nonfarm uses. The presence of coarse fragments and slow permeability in the substratum also are limitations. Some areas have potential for development of wildlife habitat or for reforestation. Capability subclass IVe.

ShB—Stockbridge-Howard gravelly silt loams, 3 to 8 percent slopes. This map unit consists of about 55 percent Stockbridge soil and 40 percent Howard soil. These soils form such as intricate pattern on the landscape that it was not practical to map them separately at the scale used. These soils have a profile similar to the one described as representative of the series, except the Stockbridge soil has a gravelly surface layer and subsoil. This map unit is on the lower part of valley sides where glacial till is mixed with glacial outwash. Some areas are undulating.

Included with these soils in mapping are a few areas that consist almost entirely of Howard soil or of Stockbridge soil. Also included are areas of soils that have a surface layer of channery silt loam and areas of moderately well drained Phelps soils in small depressions.

The soils in this map unit are suited to cultivated crops, hay and pasture, and trees. Crops used in dairy farming, for example, corn and alfalfa, grow well. The hazard of erosion is slight in cultivated areas. Erosion can be controlled by the use of cover crops and minimum tillage. Contour tillage is not feasible in some areas because of

complex slopes. Coarse fragments slightly hinder some precision tillage operations.

The presence of coarse fragments and variable permeability in the substratum are limitations to some nonfarm uses. Many areas have excellent potential as homesites. Capability subclass IIe.

ShC—Stockbridge-Howard gravelly silt loams, 8 to 15 percent slopes. This map unit consists of about 55 percent Stockbridge soil and 40 percent Howard soil. These soils form such as intricate pattern on the landscape that it was not practical to map them separately at the scale used. These soils have a profile similar to the one described as representative of the series, except the Stockbridge soil has a gravelly surface layer and subsoil. This map unit is on the lower part of valley sides where glacial till has covered over and has mixed with glacial outwash. Slopes are rolling in some areas.

Included with these soils in mapping are a few areas that consist almost entirely of Stockbridge soil or of Howard soil. Also included are a few areas of soils that have a surface layer of channery silt loam and a few small areas of moderately well drained Phelps soils on foot slopes and along drainageways.

The soils in this map unit are suited to some cultivated crops, hay and pasture, and trees. The hazard of erosion is moderate in cultivated areas that are unprotected. Minimum tillage, use of cover crops, and including sod crops in the cropping system a high proportion of the time are conservation practices that reduce erosion. Contour tillage is impractical in areas where slopes are complex. Droughtiness in midsummer and the presence of coarse fragments are concerns of management.

Slope, variable permeability in the substratum, and the presence of coarse fragments are limitations to most nonfarm uses. The less sloping areas have potential as homesites. Capability subclass IIIe.

ShD—Stockbridge-Howard gravelly silt loams, 15 to 25 percent slopes. This map unit consists of about 50 percent Stockbridge soil and 45 percent Howard soil. These soils form such an intricate pattern on the landscape that it was not practical to map them separately at the scale used. These soils have a profile similar to the one described as representative of the series, except the surface layer and subsoil are slightly thinner. Also, the Stockbridge soil has a gravelly surface layer. This map unit is on valley sides where glacial till has slumped over and has mixed with glacial outwash. In some areas slopes are complex.

Included with these soils in mapping are a few areas that consist almost entirely of Stockbridge soil or of Howard soil. A few areas of soils that have a surface layer of channery silt loam and a few seep spots and springs are also included.

The soils in this map unit are suited to pasture and trees. Cultivated crops can be grown, but the operation of machinery is difficult and the hazard of erosion is severe. If cultivated crops are grown, they should be grown infrequently and a maximum of conservation practices should be used. Contour tillage is impractical in areas that have complex slopes. Droughtiness is a greater problem on these soils than on less sloping areas of Stockbridge and Howard soils.

Slope is the main limitation to most nonfarm uses. Some areas have potential for recreational uses, for development of wildlife habitat, or as a source of sand and gravel. Capability subclass IVe.

Swanton series

The Swanton series consists of deep, poorly drained and somewhat poorly drained soils. These soils formed in glaciofluvial deposits that are mainly fine sands and that overlie glaciolacustrine deposits of clay and silt at a depth of 20 to 40 inches. They are nearly level and are on the lake plain.

In a representative profile the surface layer is dark brown fine sandy loam 9 inches thick. The subsoil is mottled and is 20 inches thick. The upper part of the subsoil is very friable, brown fine sandy loam 6 inches thick; the middle part is friable, dark brown fine sandy loam 9 inches thick; and the lower part is friable, reddish brown fine sandy loam 5 inches thick. The substratum is firm, reddish gray silty clay to a depth of 43 inches and is friable, brown strata of very fine sand and silt to a depth of 63 inches.

A high water table is in the upper part of the subsoil in spring and in other excessively wet periods. At times it is perched above the dense, fine textured substratum, but the depth to the water table generally corresponds to the natural level of ground water. Permeability is moderately rapid in the surface layer and subsoil and slow to very slow in the substratum. Rooting depth is mostly confined to the upper part of the subsoil, but some roots extend more deeply as the water table recedes in summer. Available water capacity is moderate to high. The natural content of nitrogen is medium to high, but nitrogen is released slowly to plants in spring when the soils are damp and cold. The natural supply of phosphorus is low, and the content of potassium is low to medium. The content of lime is medium to low.

Most areas of Swanton soils are used for trees and pasture or are idle. Some areas are used for hay, and a few areas are used for cultivated crops. Prolonged seasonal wetness is the main limitation to most nonfarm uses of these soils.

Representative profile of Swanton fine sandy loam, in a grassy hayfield 300 feet north of the New York State Thruway and 500 feet east of State Route 46 in the city of Oneida:

Ap—0 to 9 inches; dark brown (7.5YR 3/2) fine sandy loam; weak medium and fine granular structure; friable; many fine and few medium roots; medium acid; abrupt smooth boundary.

B21—9 to 15 inches; brown (7.5YR 5/2) fine sandy loam; common medium distinct strong brown (7.5YR 5/6) and few fine faint pinkish gray (5YR 6/2) mottles; weak fine subangular blocky structure; very friable; common fine roots; common fine pores; few dark grayish brown (10YR 4/2) wormcasts; medium acid; clear smooth boundary.

B22—15 to 24 inches; dark brown (7.5YR 4/4) fine sandy loam with a few thin lenses of heavy fine sandy loam; many medium distinct pinkish gray (7.5YR 6/2) and strong brown (7.5YR 5/6) mottles; weak medium and fine subangular blocky structure; friable; few fine roots; common fine pores; dark brown (7.5YR 4/2) ped exteriors; medium acid; clear smooth boundary.

B23—24 to 29 inches; reddish brown (5YR 4/3) fine sandy loam that grades to sandy clay loam in the lower 2 inches; common fine distinct yellowish red (5YR 4/6) and pinkish gray (7.5YR 6/2) mottles; moderate medium subangular blocky structure; friable; common fine pores; dark reddish gray (5YR 4/2) ped exteriors; thin patchy clay linings in pores and bridging some sand grains; medium acid; clear wavy boundary.

IIC—29 to 43 inches; reddish gray (5YR 5/2) silty clay with a few thin silty lenses; common fine distinct strong brown (7.5YR 5/6) and light olive gray (5Y 6/2) mottles; moderate thin platy structure; firm, sticky and plastic; few fine pores; few light gray (5YR 6/1) lime streaks in lower part; neutral; clear wavy boundary.

IIIC—43 to 63 inches; brown (10YR 5/3) strata of very fine sand and silt; common medium faint light yellowish brown (10YR 6/4) mottles; moderate thin platy structure; friable; 5 percent gravel fragments at a depth of 51 inches; strongly calcareous; moderately alkaline.

The thickness of the solum and the depth to fine textured deposits are 20 to 40 inches. Depth to carbonates is 40 to 50 inches and depth to bedrock is more than 5 feet. Coarse fragments make up 0 to 3 percent of the solum and upper part of the substratum. Reaction is strongly acid to medium acid in the solum and medium acid to neutral in the substratum to a depth of 40 inches.

Some areas have an A1 horizon. The A1 or Ap horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma mainly of 2.

The B horizon is mainly fine sandy loam, but subhorizons or lenses of heavy sandy loam, sandy loam, or very fine sandy loam are common in some profiles. The B horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 2 to 4. Mottles are common or many. Structure is very weak to moderate. Consistence is mainly friable or very friable, but in some subhorizons it is firm.

The IIC horizon is silty clay loam, silty clay, or clay. It has hue mainly of 7.5YR or 5YR, value of 4 or 5, and chroma of 2 or 3. Structure is weak or moderate platy, or the material is massive.

A IIIC horizon that is coarser textured than the IIC horizon is below a depth of 40 inches in many profiles. The IIIC horizon commonly is not so red as the IIC horizon.

Swanton soils in this survey area have redder hue than is typical for the Swanton series, but this difference does not affect the use and management of the soils.

Swanton soils form a drainage sequence with the moderately well drained Elmwood soils. Swanton soils commonly are near the somewhat poorly drained Minoa soils. They are similar to Minoa soils but are moderately deep to fine textured deposits.

Sw—Swanton fine sandy loam. This nearly level soil formed in moderately coarse textured, sandy deposits that are moderately deep to lake-laid deposits of clay and silt. Slopes range from 0 to 3 percent. This soil is mostly in the drier half of the poorly drained class and in the wetter half of the somewhat poorly drained class.

Included with this soil in mapping are a few large areas of a soil that is similar to this Swanton soil but is very poorly drained in deep depressions. These areas are indicated on the soil maps by the symbol for a wet spot. Also included are a few small areas of soils that have free carbonates within 40 inches of the surface and small areas of soils that have fine textured material within 10 to 20 inches of the surface.

If undrained, this soil generally is not suited to cultivated crops but is suited to water-tolerant hay and pasture plants and trees. Drainage is difficult to establish in some areas because of a lack of suitable outlets. Subsurface drains placed within the fine textured substratum should be closely spaced. Bedding can be used to improve surface drainage in some areas. If this soil is adequately drained, field crops and vegetables respond well to large applications of fertilizer. Minimum tillage and the use of cover crops help to maintain good soil tilth. This soil is easy to till at the proper moisture content.

Prolonged seasonal wetness and very slow or slow permeability in the substratum are limitations to many nonfarm uses of this soil. Sidewalls of excavations for underground utilities and of other excavations commonly are unstable. Capability subclass IIIw.

Teel series

The Teel series consists of deep, moderately well drained and somewhat poorly drained soils. These soils formed in silty alluvium that was washed from upland glacial drift with a medium to high content of lime. They are nearly level and are along streams. They are subject to flooding.

In a representative profile the surface layer is dark brown silt loam 5 inches thick. The upper part of the subsoil is friable, dark reddish gray silt loam 11 inches thick, and the lower part is friable, mottled, reddish brown silt loam 22 inches thick. The substratum, to a depth of 58 inches, is friable, dark reddish gray silt loam that grades to very fine sandy loam.

Many areas of these soils are flooded annually. Some areas, which are slightly higher on the landscape, are flooded once in every 5 to 10 years. A temporary seasonal high water table is in the subsoil in spring. Depth to the water table somewhat depends on the water level in the adjacent stream. Permeability is moderate throughout the soil. Rooting depth is mostly confined to the upper part of the subsoil by the water table. As the water table drops late in spring, some roots extend more deeply. Available water capacity is high. The natural content of nitrogen is medium to high, supply of phosphorus is low to medium, and content of potassium is high. The natural content of lime is medium.

Most areas of these soils are used for row crops and hay and pasture crops. A few areas are idle or are used for trees. The hazard of flooding is the main limitation to many nonfarm uses of these soils.

Representative profile of Teel silt loam, in a pasture 80 feet east of County Road 33 and 50 feet south of Oneida Creek in the city of Oneida:

Ap—0 to 5 inches; dark brown (7.5YR 3/2) silt loam; brown (7.5YR 4/2) rubbed; moderate medium granular structure; friable; many fine roots; neutral; clear smooth boundary.

B21—5 to 16 inches; dark reddish gray (5YR 4/2) silt loam, crushed; moderate coarse prismatic structure parting to moderate coarse subangular blocky; friable; common fine roots; many fine and few medium pores; neutral; gradual smooth boundary.

B22—16 to 38 inches; reddish brown (5YR 4/3) silt loam, crushed; few medium faint reddish brown (5YR 5/4) and yellowish red (5YR 4/6)

mottles and common medium faint dark reddish gray (5YR 4/2) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; common fine roots in upper part; many fine, common medium, and few large pores; few thin clay patches in pores; mildly alkaline; gradual, smooth boundary.

C—38 to 58 inches; dark reddish gray (5YR 4/2) silt loam that grades to very fine sandy loam in the lower part; common medium distinct strong brown (7.5YR 5/6) and few fine faint reddish gray (5YR 5/2) mottles; massive; friable; common fine pores; weakly calcareous below a depth of 42 inches; mildly alkaline.

The solum is 26 to 40 inches thick. Depth to carbonates is more than 40 inches, and depth to bedrock is more than 5 feet. Coarse fragments generally are absent in the solum and make up as much as 3 percent, by volume, of some subhorizons. Reaction is medium acid to neutral in the upper part of the solum and neutral or mildly alkaline in the lower part of the solum.

Some areas have an A1 horizon. The A1 or Ap horizon has hue of 10YR or 7.5YR, value of 2 to 4, and chroma of 2. Consistence is friable or very friable.

The B horizon is silt loam or very fine sandy loam. It has hue of 10YR to 5YR, value of 3 to 5, and chroma of 2 or 3. Structure is subangular blocky or prismatic, or both. Consistence is friable or firm.

The C horizon is silt loam or very fine sandy loam to a depth of 40 inches or more. Gravelly strata that have a fine earth texture of very fine sandy loam are at a depth of more than 40 inches. This horizon has hue similar to that of the B horizon and has value of 4 or 5 and chroma of 1 to 3. Structure is platy, or the material is massive. Consistence is friable or firm.

Teel soils form a drainage sequence with the well drained Hamlin soils and the poorly drained and very poorly drained Wayland soils. They formed in deposits similar to those in which Middlebury soils formed but are less acid and more silty than those soils.

Te—Teel silt loam. This soil is nearly level and formed in recent alluvium on flood plains. Slopes range from 0 to 3 percent. Because of the adjacent meandering streams, some areas are irregular in shape.

Included with this soil in mapping are a few small areas of poorly drained and very poorly drained Wayland soils. These areas are indicated on the soil maps by the symbol for a wet spot. Also included are a few areas of soils that have a surface layer or subsoil of fine sandy loam. A few areas of a soil along high gradient streams that has a very gravelly substratum at a depth of 30 to 40 inches are also included.

This soil is suited to most cultivated crops and to some vegetable crops that do not require planting early in spring. In some areas this soil is used intensively for corn and for alfalfa grown for hay. Temporary seasonal wetness and occasional flooding late in spring briefly delay normal tillage operations. This soil is easy to till at the proper moisture content. Using cover crops and including sod crops in the cropping system help to maintain good soil tilth and to protect the soil during periods of flooding. In some areas special measures are required to control streambank erosion. Drainage for the included wet spots generally is difficult to achieve unless the adjacent stream is lowered.

Flooding, temporary seasonal wetness, and poor stability are severe limitations to the use of this soil for nonfarm purposes. Many areas in and near villages and cities are suitable for use as open space corridors. Capability subclass IIw.

Tuller series

The Tuller series consists of shallow, somewhat poorly drained and poorly drained soils. These soils formed in a thin mantle of glacial till that commonly mixed with frost-fractured material derived from the underlying siltstone, sandstone, and shale bedrock. They are nearly level to gently sloping and are at the higher elevations of the upland plateau.

In a representative profile the surface layer is very dark grayish brown channery silt loam 6 inches thick. The subsoil is mottled, grayish brown channery silt loam 12 inches thick. The upper part of the subsoil is friable, and the lower part is firm. Thin bedded siltstone and shale is at a depth of 18 inches.

A seasonal high water table is in the subsoil in spring and in other excessively wet periods. The water table commonly is perched above the bedrock. Permeability is moderate in the surface layer and slow or moderately slow in the subsoil. Roots are confined to the 10- to 20-inch thick zone above the bedrock. Available water capacity is low to very low. The natural content of nitrogen is medium to high, but nitrogen is released slowly to plants in spring when the soils are damp and cold. The supply of available phosphorus is low and the supply of potassium is medium to low. The natural content of lime is low.

Most areas of these soils are used for pasture and trees or are idle. The shallow depth to bedrock and seasonal wetness are the main limitations to nonfarm uses of these soils.

Representative profile of Tuller channery silt loam, 0 to 8 percent slopes, in a pasture 130 yards east of Maxon Road and 1/2 mile south of Lebanon Road in the town of Georgetown:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) channery silt loam, light brownish gray (10YR 6/2) dry; moderate fine and medium granular structure; friable; many fine roots; 15 percent coarse fragments; medium acid (limed); clear smooth boundary.

B21—6 to 11 inches; grayish brown (10YR 5/2) channery silt loam; common fine distinct strong brown (7.5YR 5/6) and dark brown (7.5YR 4/4) mottles; moderate fine and medium subangular blocky structure; friable; common fine roots; common fine pores; few very dark grayish brown (10YR 3/2) vertical root stains and worm casts; 15 percent coarse fragments; medium acid (limed); gradual wavy boundary.

B22—11 to 18 inches; grayish brown (2.5Y 5/2) channery silt loam; many medium prominent strong brown (7.5YR 5/8), few coarse distinct brown (7.5YR 4/4), and few fine faint gray (10YR 6/1) mottles; weak medium and fine subangular blocky structure; firm; few fine roots; common fine pores; 20 percent coarse fragments grading to 30 percent in the lower part; strongly acid; abrupt smooth boundary.

IIR—18 inches; dark gray and (N 4/0) and dark grayish brown (2.5Y 4/2) thin-bedded acid siltstone and shale bedrock; moderately hard and brittle in upper layers.

The thickness of the solum and the depth to bedrock range from 10 to 20 inches. Coarse fragments are mainly flat and angular and make up 15 to 35 percent, by volume, of the solum. Reaction in unlimed areas is strongly acid or very strongly acid in the surface layer and very strongly acid to medium acid in the subsoil.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2. Consistence is friable or very friable. Some areas have a thin O2 horizon or an A1 horizon.

The B horizon is loam or silt loam and includes channery and flaggy analogues of these textures. It has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma mainly of 2. In some places chroma is 3. High chroma mottles are distinct or prominent. Structure is subangular blocky or prismatic. Consistence is friable or firm.

The underlying bedrock is oriented horizontally and ranges from thin, interbedded shale and siltstone to thick-bedded sandstone.

The content of coarse fragments in Tuller soils in this survey area is lower than that defined in the range for the series, but this difference does not affect the use and management of the soils.

Tuller soils are in a drainage sequence with the somewhat excessively drained to moderately well drained Arnot soils. They are near the somewhat poorly drained Volusia soils and the poorly drained Chippewa soils. Tuller soils formed in material similar to that in which the Volusia and Chippewa soils formed but are shallower to bedrock than those soils.

TuB—Tuller channery silt loam, 0 to 8 percent slopes. This soil has the profile described as representative of the series. It is in slight depressions, nearly level areas, slightly convex areas, and gently sloping areas. It is mainly poorly drained in the nearly level areas and depressions and is mainly somewhat poorly drained in the slightly convex and gently sloping areas where runoff is removed more quickly.

Included with this soil in mapping are a few areas of soils that are 20 to 40 inches deep to bedrock. Also included are somewhat excessively drained to moderately well drained Arnot soils and well drained Lordstown soils on a few small rises and knolls. A few small areas of soils that have a subsoil of silty clay loam are also included.

This soil is poorly suited to most cultivated crops. It is suited to trees and pasture plants that can tolerate wetness in spring and droughtiness in summer. Drainage is very difficult to establish because of the shallow soil depth to bedrock. Interceptor ditches to divert runoff and a bedding system can be used to improve surface drainage in some areas. The hazard of erosion is slight in gently sloping areas that are unprotected. Flat coarse fragments slightly hinder some tillage operations.

Shallow depth to bedrock and seasonal wetness are limitations to the use of this soil for many nonfarm purposes. Some areas have potential for development of wildlife habitat. Capability subclass IVw.

Volusia series

The Volusia series consists of deep, somewhat poorly drained soils that have a fragipan. These soils formed in glacial till derived from siltstone, sandstone, and shale. They are nearly level to sloping and are at the higher elevations for the dissected upland plateau.

In a representative profile the surface layer is very dark grayish brown channery silt loam 8 inches thick. The upper part of the subsoil is friable, mottled, brown channery silt loam 3 inches thick. Below this is a thin, leached layer of mottled, light brownish gray channery loam 2 inches thick. The lower part of the subsoil is a very firm, brittle fragipan of mottled, brown to dark grayish brown channery loam 29 inches thick. The substratum, to a depth of 64 inches, is firm, dark grayish brown very channery loam.

A seasonal high water table is perched above the very slowly permeable or slowly permeable fragipan and substratum in the spring and in other periods of excessive wetness. Permeability is moderate in the surface layer and upper part of the subsoil. Roots are mainly confined to the more pervious 10- to 20-inch thick zone above the dense fragipan. Available water capacity is low. However, there is usually sufficient lateral seepage across the top of the fragipan to sustain plant growth except in extremely dry periods. The natural content of nitrogen is medium to high, but nitrogen is slowly available to plants when the soils are damp and cold. The natural supply of available phosphorus is low, and the content of potassium is medium to low. The natural content of lime is low to medium.

Most areas of these soils are idle or are used for hay and pasture crops, and trees. A few areas are partially drained and are used for cultivated crops. Seasonal wetness and slow or very slow permeability in the fragipan are the main limitations to some nonfarm uses of these soils.

Representative profile of Volusia channery silt loam, 3 to 8 percent slopes, in a pasture 100 yards east of Lebanon Hill Road and 250 yards south of Geer Road in the town of Lebanon:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) channery silt loam, dark grayish brown (10YR 4/2) rubbed; weak fine granular structure; friable; many fine roots; 15 percent coarse fragments; medium acid; abrupt wavy boundary.

B2—8 to 11 inches; brown (10YR 5/3) channery silt loam; common fine faint olive brown (2.5Y 4/4) mottles; weak fine subangular blocky structure; friable; many fine roots; many fine pores; 20 percent coarse fragments; medium acid; clear wavy boundary.

A'2—11 to 13 inches; light brownish gray (10YR 6/2) channery loam; common fine distinct yellowish brown (10YR 5/6) and brown (10YR 5/3) mottles; weak fine subangular blocky structure; firm; few to common fine roots; common fine pores; 30 percent coarse fragments; slightly acid; gradual wavy boundary.

B'x—13 to 42 inches; brown (10YR 5/3) grading to dark grayish brown (10YR 4/2) channery loam; common fine faint dark yellowish brown (10YR 4/4) and few distinct yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic structure, massive within prisms; very firm and brittle; few roots along prism faces in upper part; few fine pores that have clay linings within prisms; thin gray (10YR 6/1) silty streaks along prism faces; 30 percent coarse fragments, the percentage increasing with increasing depth; slightly acid; gradual wavy boundary.

C—42 to 64 inches; dark grayish brown (10YR 4/2) very channery loam that has lenses of heavy silt loam; common fine faint dark yellowish brown (10YR 4/4) mottles; massive; firm; few fine pores; 45 percent coarse fragments; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches, and depth to the fragipan is 10 to 20 inches. Depth to carbonates is more than 50 inches, and depth to bedrock is more than 5 feet. Flat, angular fragments of siltstone, sandstone, and shale make up 15 to 30 percent, by volume, of the upper part of the solum and as much as 50 percent of the substratum. Unless the soil is limed, reaction is very strongly acid to slightly acid in the upper part of the solum and medium acid to neutral in the lower part of the solum.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2.

The B2 horizon is loam or silt loam and includes channery and gravelly analogues. The B2 horizon has hue of 10YR or 2.5YR, value of 4 or 5, and chroma mainly of 3. Some profiles do not have a B2 horizon.

The A'2 horizon is similar to the B2 horizon, except it has value of 5 or 6 and chroma of 2 or 3. Chroma of 2 is dominant in the lower part and is dominant in the upper part in some places. Mottles that have higher chroma are common to many. Consistence is friable or firm.

The B'x horizon is channery or very channery loam or silt loam. It has hue of 10YR or 2.5YR, value of 4 or 5, and chroma of 2 to 4. Within very coarse prisms, structure is very weak subangular blocky or the material is massive. Consistence is firm or very firm.

The C horizon has texture and consistence similar to those of the B'x horizon. Structure is platy, or the material is massive.

Volusia soils form a drainage sequence with the well drained Bath soils, moderately well drained Mardin soils, and poorly drained Chippewa soils.

VoA—Volusia channery silt loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, except mottles are more distinct and more abundant just below the surface layer. It is on the top of broad hills and benches and receives little or no runoff from adjacent soils. Because runoff is slow this soil is mostly in the wetter half of the somewhat poorly drained class.

Included with this soil in mapping are small areas of poorly drained Chippewa soils in slight depressions and along field drainageways. Also included are a few small areas of gently sloping Volusia soil and of soils that are less than 40 inches deep to bedrock.

This soil is suited to hay and pasture plants and trees that can tolerate seasonal wetness. Unless this soil is drained, wetness delays the planting of cultivated crops until late in spring. This soil is somewhat more difficult to drain than the gently sloping Volusia soil. Because of the shallow depth to the fragipan, drains must be closely spaced to be effective. Short season varieties of row crops generally grow best. Coarse fragments slightly hinder some tillage operations.

Seasonal wetness, very slow or slow permeability in the fragipan, and the presence of coarse fragments are limitations to some nonfarm uses of the soil. Some areas have excellent potential as pond sites. Capability subclass IIIw.

VoB—Volusia channery silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It is on foot slopes and long, plane slopes and receives runoff from higher adjacent soils.

Included with this soil in mapping are a few small areas of poorly drained Chippewa soils along field drainageways and moderately well drained Mardin soils in slightly higher positions than this Volusia soil. A few areas of soils that have bedrock within 40 inches of the surface are also included.

This soil is suited to hay and pasture crops and trees. Species that can tolerate seasonal wetness early in spring grow best. Cultivated crops can be grown if drainage is provided. Interceptor drains to divert runoff are effective in some areas. This soil is easier to drain but is more susceptible to erosion than the nearly level Volusia soil. Contour tillage, use of cover crops, and minimum tillage are practices that reduce erosion and help to maintain good soil tilth. Coarse fragments slightly hinder precision tillage operations. In some years droughtiness is a problem from midsummer to late in summer.

Seasonal wetness and very slow or slow permeability in the fragipan and substratum are limitations to many nonfarm uses of this soil. Slope and the presence of coarse fragments are limitations to some nonfarm uses. Many areas have potential as pond sites. Capability subclass IIIw.

VoC—Volusia channery silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, except the surface layer and upper part of the subsoil are slightly thinner. It is on hillsides and foot slopes. Slopes are plane or slightly concave. This soil receives a large amount of runoff and seepage from higher adjacent soils.

Included with this soil in mapping are a few small areas of poorly drained Chippewa soils along drainageways and on toeslopes. Also included are Mardin soils in positions higher on the landscape than this Volusia soil and soils that have bedrock within 40 inches of the surface. A few areas of soils that have large stones on the surface are also included and are indicated on the soil maps by the symbol for a stony spot.

If undrained, this soil is suited to some hay and pasture plants and trees that can tolerate seasonal wetness. If cultivated crops are grown, the principal limitations are a moderate to severe hazard of erosion, seasonal wetness, low content of nutrients and lime, and droughtiness from midsummer to late in summer. Contour tillage, stripcropping, and use of cover crops are practices that help to prevent erosion and to conserve moisture during dry summers. Interceptor drains to divert runoff and randomly placed subsurface drains for wet spots can be used to improve most areas. Coarse fragments hinder some tillage operations.

Seasonal wetness, slope, very slow permeability in the fragipan and substratum, and the presence of coarse fragments are limitations to many nonfarm uses of this soil. Some areas have potential for development of wildlife habitat. Capability subclass IIIe.

Wallkill series

The Wallkill series consists of deep, very poorly drained soils. These soils formed in silty alluvial deposits overlying organic material. They are nearly level and are on low flood plains along streams that cross areas of organic deposits.

In a representative profile the surface layer is very dark gray silt loam 10 inches thick. The subsoil is friable, mottled, very dark brown silt loam 7 inches thick. It is underlain by well decomposed organic layers that extend to a depth of 43 inches. The upper layer is black, the middle layer is black and mottled, and the lower layer is very dark grayish brown and mottled. The substratum, to a depth of 60 inches, is friable, gray marl.

These soils are subject to flooding and ponding. Unless these soils are drained, the water table is at or near the surface for long periods during the year. Permeability is moderate in the mineral soil layers and moderately rapid or rapid in the underlying organic layers. Rooting depth is mainly confined to the surface layer in undrained areas. In drained areas, root penetration is good and the available water capacity is high. The natural supply of nitrogen is high, but nitrogen is released slowly to plants in spring when the soils are damp and cold. The supply of available phosphorus is low, and content of available potassium is medium. The natural content of lime is medium to high.

Some areas of these soils are drained and are used for row crops or vegetable crops. Undrained areas are used for permanent pasture and trees. Flooding and prolonged wetness are the main limitations to nonfarm uses of these soils.

Representative profile of Wallkill silt loam, in a cropped field 50 feet north of Hardwood Island Road and 200 yards east of Douglas Ditch in the town of Lenox:

Ap—0 to 10 inches; very dark gray (10YR 3/2) silt loam, light gray (10YR 6/1) dry; few fine distinct brown (7.5YR 4/4) mottles; moderate coarse granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

Bg—10 to 17 inches; very dark brown (10YR 2/2) silt loam; few fine faint dark grayish brown (10YR 4/2) mottles; weak fine and medium subangular blocky structure; friable; few fine roots; common fine pores; neutral; clear smooth boundary.

IIOa1—17 to 27 inches; black (N 2/0) sapric material (muck), broken face and rubbed; about 25 percent fiber, less than 5 percent rubbed; weak coarse subangular blocky structure parting to weak thin platy; friable; common fine pores; recognizable fibers are herbaceous; few woody fragments; neutral; clear wavy boundary.

IIOa2—27 to 33 inches; black (5YR 2/1) sapric material (muck), broken face and rubbed; few distinct dark brown (10YR 3/3) root mottles; about 20 percent fibers, less than 5 percent rubbed; moderate medium platy structure; friable; few fine pores; fibers are herbaceous; neutral; abrupt smooth boundary.

IIOa3—33 to 43 inches; very dark grayish brown (10YR 3/2) sapric material (muck), broken face and rubbed; few fine faint brown (7.5YR 4/4) mottles; 10 percent fibers, less than 2 percent rubbed; weak thin platy structure; friable; common fine pores; about 50 percent mineral material; fibers are mainly herbaceous; neutral; abrupt smooth boundary.

IIIC—43 to 60 inches; gray (10YR 5/1) marl; common fine distinct brown (7.5YR 5/4) mottles; massive; friable; few quartz grains; strongly calcareous.

Depth to organic material ranges from 16 to 35 inches but generally is 16 to 22 inches. Thickness of the organic material is mainly 20 to 30 inches, but in a few profiles it is as much as 45 inches. The organic material commonly is underlain by marl, but in some profiles it is underlain by silty or sandy deposits. Depth to bedrock is more than 5 feet. Coarse fragments generally are absent in the solum, but they make up as much as 5 percent, by volume, of some profiles. Reaction is medium acid to neutral in the solum and in the organic layers.

Some areas have an A1 horizon. The Ap or A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Consistence is friable or very friable.

The B horizon is mainly silt loam or loam, but subhorizons in some places are light silty clay loam. The B horizon has hue of 10YR or 7.5YR, value of 2 to 4, and chroma of 1 or 2. Mottles commonly are present. Structure is blocky or prismatic. Consistence is friable or firm. Some areas have a C horizon that is similar to the B horizon.

The organic layers, or O horizons, are sapric material (muck). Woody fragments make up 0 to 10 percent of the organic material. Mineral soil material makes up as much as 60 percent of some layers. The organic layers have hue of 10YR or are neutral, and they have value of 2 or 3 and chroma of 0 to 2.

The IIIC horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 0 to 2. Consistence is friable or firm.

Wallkill soils commonly are near Warners and Wayland soils. Wallkill soils formed in alluvium similar to that in which these soils formed. However, the alluvium in Wallkill soils is directly underlain by organic material. The alluvium in Warners and Wayland soils is not underlain by organic material.

Wa—Wallkill silt loam. This soil is nearly level and formed in silty alluvial sediment overlying organic deposits. It is mainly on low flood plains on the lake plain and also is on the bottom of some upland valleys. Slopes range from 0 to 3 percent but are mostly less than 2 percent.

Included with this soil in mapping are small areas of soils in which the organic material underlying the alluvial mantle is less than 20 inches thick. Also included are a few small areas of soils that are similar to this Wallkill soil but are poorly drained and somewhat poorly drained; these soils are slightly higher on the landscape than the Wallkill soil. A few small spots of Warners soils are also included.

If undrained, this soil is suited to water-tolerant pasture grasses and trees. In some areas drainage is difficult and expensive to install because of the low position of this soil on the landscape. Using deep open ditches, lowering the adjacent streambed, or diking to protect the soil from flooding is required in some places. If this soil is drained, row crops and vegetable crops grow very well. This soil is easy to till at the proper moisture content, and good tilth can be maintained with a minimum of conservation practices.

The hazard of flooding, prolonged wetness, and instability of the substratum are limitations to the use of this soil for many nonfarm purposes. Some areas have potential for development of wetland wildlife habitat or are suitable for use as open space corridors. Capability subclass IVw.

Wampsville series

The Wampsville series consists of deep, well drained soils. These soils formed in gravelly glaciofluvial deposits that have a high content of soft red shale and a lower content of limestone and sandstone. They are nearly level to hilly and are on terraces and kame moraines along the northern edge of the upland plateau.

In a representative profile the surface layer is dark brown gravelly silt loam 8 inches thick. The subsurface layer is leached, reddish brown gravelly loam 4 inches thick. The subsoil is friable and is 24 inches thick; it is mostly reddish brown gravelly loam and gravelly clay loam. The substratum is brown very gravelly loam to a depth of 45 inches and is stratified sand and gravel to a depth of 72 inches or more.

The seasonal high water table remains well below the subsoil. Permeability is moderate in the surface layer and

subsoil and moderately rapid to rapid in the substratum. Roots can easily extend to the top of the substratum, and some taproots extend more deeply. The available water capacity is moderate to high. Because excess water is removed quickly, these soils dry and warm rapidly in spring. The natural content of nitrogen is medium, supply of available phosphorus is low, and content of available potassium is medium to high. The natural content of lime is medium to high.

Most areas of these soils are used for cultivated crops and hay. Some areas are used for pasture, and a few areas are used for trees. There are few limitations to nonfarm uses that require good drainage.

Representative profile of Wampsville gravelly silt loam, undulating, in a hayfield 1/2 mile east of the village of Wampsville at the edge of a gravel pit in the town of Lenox:

Ap—0 to 8 inches; dark brown (7.5YR 4/2) gravelly silt loam; moderate medium granular structure; friable; many fine roots; 15 percent gravel; medium acid; abrupt smooth boundary.

A2—8 to 12 inches; reddish brown (5YR 5/3) gravelly loam; weak fine granular structure; friable; common fine roots; common medium and large pores; 15 percent gravel; medium acid; clear wavy boundary.

B&A—12 to 16 inches; reddish brown (5YR 4/4) gravelly heavy loam; moderate medium subangular blocky structure; friable; common roots; common fine and medium pores; clay linings in pores; reddish brown (5YR 5/3) coatings, pinkish gray (7.5YR 7/2) dry, 2 to 4 millimeters thick on peds; 20 percent gravel; slightly acid; clear wavy boundary.

B21t—16 to 24 inches; reddish brown (5YR 4/4) gravelly clay loam; moderate medium subangular blocky structure; friable; few roots; thick clay films on faces of peds; 20 percent gravel; slightly acid; gradual wavy boundary.

B22t—24 to 32 inches; dark reddish brown (5YR 3/3) gravelly clay loam; moderate coarse subangular blocky structure; friable; few fine roots; common fine pores; distinct clay films on faces of peds and in pores; 25 percent gravel; slightly acid; gradual wavy boundary.

B3—32 to 36 inches; dark reddish gray (5YR 4/2) gravelly loam; weak coarse subangular blocky structure; friable; few fine pores; patchy clay films on faces of peds; 30 percent gravel; neutral; clear wavy boundary.

C1—36 to 45 inches; brown (7.5YR 4/2) very gravelly loam; massive; friable; numerous reddish and greenish gray shale chips; 35 percent gravel; calcareous; moderately alkaline; abrupt irregular boundary.

IIC2—45 to 72 inches; stratified sand and gravel; numerous reddish and greenish gray shale fragments; strongly calcareous; moderately alkaline.

The thickness of the solum is 30 to 40 inches, and depth to carbonates is 26 to 48 inches. Stratified sand and gravel is at a depth of more than 40 inches, and depth to bedrock is more than 8 feet. Coarse fragments are reddish and greenish shale, and gravel and cobbles of limestone and sandstone. Coarse fragments make up 15 to 35 percent, by volume, of the solum and 30 to 65 percent of the substratum. The percentage increases with increasing depth. Reaction is strongly acid to neutral in the upper part of the solum and commonly increases to mildly alkaline in the lower part.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2.

The A2 horizon is loam or silt loam, and gravelly analogues are common. It has hue of 10YR to 5YR, value of 5 or 6, and chroma of 2 to 4.

The A and B portions of the B&A horizon have color and texture similar to those of the Bt and A2 horizon, respectively.

The Bt horizon ranges from gravelly heavy loam to gravelly clay loam. It has hue of 7.5YR to 2.5YR, value of 3 or 4, and chroma of 2 to 4. Structure is weak or moderate. Consistence is friable or firm.

The B3 horizon is similar to the B2t horizon, except it is slightly coarser textured.

The C horizon has variable color depending on the color inherited from the shale. The upper part of the C horizon is loam or silt loam and includes gravelly and very gravelly analogues, and the lower part is stratified very gravelly sand.

Wampsville soils are in a drainage sequence with the moderately well drained Phelps soils and the somewhat poorly drained and poorly drained Fredon soils. They are similar to Palmyra soils but do not have coarse textured sand and gravel deposits within 40 inches of the surface, which those soils have.

WeA—Wampsville gravelly silt loam, nearly level. This soil has a profile similar to the one described as representative of the series, except the surface layer and subsoil are slightly thicker. It is on stream terraces and outwash plains. Slopes range from 0 to 3 percent.

Included with this soil in mapping are a few small areas of moderately well drained Phelps soils and somewhat poorly drained and poorly drained Fredon soils in slight depressions and along drainageways. A few areas of undulating Wampsville soils are also included.

This soil is well suited to cultivated crops and hay and pasture crops. Coarse fragments slightly hinder precision tillage operations, but cultivation generally is not difficult. Maintaining good soil tilth is important especially in intensively cultivated areas. The use of cover crops, return of crop residue to the soil, and minimum tillage help to preserve good soil tilth and to conserve moisture. Crops generally have excellent response to applications of large amounts of fertilizer.

The presence of coarse fragments is a limitation to the use of this soil for nonfarm uses that require good drainage. Most areas have excellent potential as homesites. Capability class I.

WeB—Wampsville gravelly silt loam, undulating. This soil has the profile described as representative of the series. It is on terraces and outwash plains. In some mapped areas slopes are broad and simple. Slopes range from 3 to 8 percent.

Included with this soil in mapping are a few small areas of somewhat poorly drained and poorly drained Fredon soils in depressions and along drainageways. Also included are a few small areas of nearly level Wampsville soils and a few areas of Palmyra soils.

This soil is well suited to cultivated crops and hay and pasture crops. The hazard of erosion is slight in cultivated areas, especially on long slopes. Erosion can be controlled by the use of cover crops, minimum tillage, and contour tillage where practical. These practices also help to maintain good soil tilth in intensively cultivated areas. Most crops have good response to the application of large amounts of fertilizer. Installing drainage for the included wetter soils benefits some fields.

Slope and the presence of coarse fragments are slight limitations to some nonfarm uses that require good drainage. Some areas have excellent potential as homesites. Capability subclass IIe.

WeC—Wampsville gravelly silt loam, rolling. This soil has a profile similar to the one described as represen-

tative of the series, except the surface layer and subsoil are slightly thinner because of erosion. In many areas this soil is on moraines that have complex slopes, and in some areas it is on long and narrow terrace fronts and scarps. Slopes range from 8 to 15 percent.

Included with this soil in mapping are a few small areas of somewhat poorly drained and poorly drained Fredon soils and very poorly drained Halsey soils in deep depressions and along drainageways. The more prominent of these areas are indicated on the soil maps by the symbol for a wet spot or field drainageway. A few areas of Palmyra soils and a few spots of severely eroded soils are also included.

This soil is suited to cultivated crops, but in some areas it is better suited to hay and pasture crops and trees. Erosion is moderately difficult to control in cultivated areas. Contouring is not feasible in many areas because of complex slopes. Minimum tillage, using cover crops, and using a cropping system that consists mainly of sod crops help to control erosion and to maintain good soil tilth. Droughtiness in midsummer is a slightly greater problem on this soil than on less sloping Wampsville soils.

Slope and the presence of coarse fragments are the main limitations to nonfarm uses. Homesites should be carefully selected. This soil is poorly suited as a source of sand and gravel because of the high content of soft shale. Capability subclass IIIe.

WeD—Wampsville gravelly silt loam, hilly. This soil has a profile similar to the one described as representative of the series, except the surface layer and subsoil are thinner and have a higher content of coarse fragments. This soil is mostly on moraines that have complex slopes and also is on long, narrow terrace fronts that have simple slopes. Slopes range from 15 to 25 percent.

Included with this soil in mapping are a few areas of severely eroded soils. Also included are poorly drained and very poorly drained soils that are similar to Fredon and Halsey soils; these included soils are in a few small, deep depressions and in springs and are indicated on the soil maps by the symbol for a wet spot or spring. A few areas of Palmyra soils are also included.

This soil is best suited to hay and pasture crops and trees. Because of slope, the operation of equipment is somewhat difficult and the hazard of erosion is severe. Contour tillage generally is not feasible, but minimum tillage, using cover crops, and using a cropping system that consists mainly of sod crops are important management practices. Because runoff is rapid, droughtiness is a slight problem in midsummer.

Slope is a severe limitation to most nonfarm uses of this soil. This soil is poorly suited as a source for sand and gravel because of the high content of soft shale. Capability subclass IVe.

Wareham series

The Wareham series consists of deep, poorly drained soils. These soils formed in glaciofluvial (water-laid) and eolian (wind-laid) deposits that are mainly fine sand. They are nearly level and are in depressional areas of benches and deltas on the lake plain.

In a representative profile a layer of black organic material 2 inches thick is on the surface. The surface layer is very dark gray loamy fine sand 6 inches thick. The substratum extends to a depth of 58 inches. The upper part is very friable and friable, grayish brown loamy fine sand, and the lower part is very friable, dark brown and brown loamy sand.

The water table is at or near the surface for long periods in spring and in other excessively wet periods. Permeability is rapid throughout the soil. In undrained areas rooting depth is mainly confined to the upper 12 inches, but in drained areas root penetration is excellent. Available water capacity is low to moderate. The natural supply of nitrogen is medium to high, but nitrogen is released slowly to plants in spring when the soils are damp and cold. The natural supply of phosphorus is very low, and content of potassium is low. The natural content of lime is also low.

Most areas of these soils are idle or are used for trees. A few areas are drained and are used for cultivated crops. Prolonged wetness is the main limitation to most nonfarm uses.

Representative profile of Wareham loamy fine sand, in a wooded area 40 feet west of Black Creek Road and 0.6 mile south of Chestnut Ridge Road in the town of Sullivan:

O2—2 to 0 inches; black (5YR 2/1) partially decomposed organic material; 50 percent fibers, 15 percent rubbed; weak medium granular structure; friable; many fine and few medium live roots; fibers are 70 percent herbaceous and 30 percent woody; 25 percent mineral material; strongly acid; abrupt smooth boundary.

A1—0 to 6 inches; very dark gray (10YR 3/1) loamy fine sand; weak fine granular structure; very friable; many fine and few medium roots; common clean sand grains; strongly acid; clear smooth boundary.

C1g—6 to 15 inches; grayish brown (10YR 5/2) loamy fine sand with few firmer nodules of fine sandy loam; few fine distinct brown (7.5YR 5/4) mottles; massive; very friable; few fine roots; common fine pores; few very dark grayish brown (10YR 3/2) organic areas in upper part; strongly acid; clear smooth boundary.

C2g—15 to 20 inches; grayish brown (10YR 5/2) loamy fine sand; common medium distinct strong brown (7.5YR 5/6) and gray (10YR 5/1) mottles; massive; friable; common fine pores; 10 percent distinct dark reddish brown (5YR 3/4) fine sandy loam nodules or lenses; strongly acid; clear smooth boundary.

C3g—20 to 27 inches; dark brown (7.5YR 4/2) loamy sand; many medium distinct gray (10YR 5/1) and few strong brown (7.5YR 5/6) mottles; single grain; very friable; medium acid; clear smooth boundary.

C4g—27 to 58 inches; brown (7.5YR 5/2) loamy sand; common fine distinct brown (7.5YR 4/4) mottles; single grain; very friable; medium acid.

Carbonates are not present within 60 inches of the surface. Depth to bedrock is more than 5 feet. Coarse fragments generally are absent, but gravel makes up as much as 15 percent, by volume, of the soil material in a few profiles. Reaction is very strongly acid to medium acid throughout the profile.

The O horizon is sapric or hemic material and is 1 to 5 inches thick. Some areas do not have an O horizon.

The A1 horizon has hue of 10YR or is neutral, and it has value of 2 or 3 and chroma of 0 or 1.

The upper Cg horizons are loamy sand, loamy fine sand, or fine sand and commonly have a few lenses or nodules of very fine sandy loam or fine sandy loam. They have hue of 10YR or 7.5YR, value of 5 or 6, and chroma mostly of 2. Mottles of higher and lower chroma commonly are present. Consistence is loose or friable.

The lower Cg horizons are loamy sand or sand. They have color similar to that of the upper Cg horizons, except they have value of 4 or 5 and chroma of 2 or 3. The material is massive or single grain.

Wareham soils formed in parent material similar to that in which the somewhat excessively drained Colonie soils, the moderately well drained Elnora soils, and the somewhat poorly drained and poorly drained Naumburg soils formed. They are similar to Lamson soils, except they have a coarser textured surface layer and subsoil.

Wh—Wareham loamy fine sand. This soil is nearly level and formed in deposits that are mainly fine sand. It is in low areas and depressions. Slopes are 0 to 3 percent. This soil receives a moderate amount of subsurface seepage from higher adjacent soils.

Included with this soil in mapping are small areas of soils that have a surface layer or subsoil of very fine sandy loam or fine sandy loam. Also included are a few small areas of a soil that is similar to this Wareham soil but is very poorly drained.

In undrained areas this soil is not suited to cultivated crops but is suited to unimproved pasture and water-tolerant trees. Drainage is difficult to establish in some places because of the lack of suitable outlets. In drained areas this soil is suited to most crops commonly grown in the survey area, including vegetables. Special precautions are needed to prevent very fine sand and fine sand from plugging underground drains. In drained areas this soil is easy to till and responds well to the application of large amounts of fertilizer. Droughtiness can be a serious problem in overdrained areas.

Prolonged wetness is a limitation to most nonfarm uses. Special precaution is required during the installation of underground utilities, because the fine sand readily slumps and flows when saturated. Capability subclass IVw.

Warners series

The Warners series consists of deep, very poorly drained soils. These soils formed in silty alluvial deposits that overlie marl. They are nearly level and are mainly in low areas on the lake plain. They are subject to flooding.

In a representative profile the surface layer is very dark brown mucky silt loam 4 inches thick and friable, mottled, very dark grayish brown silt loam 21 inches thick. The upper 3 inches of the substratum is friable, mottled, very dark gray muck silt loam. Below this, to a depth of 70 inches, the substratum is friable, light gray grading to gray marl.

These soils are subject to flooding unless they are drained and protected. The water table in undrained areas is at or near the surface throughout much of the year. Permeability is moderately slow or moderate. In undrained areas the rooting depth is mostly confined to the surface layer. In drained areas roots can extend to the top of the marl substratum and available water capacity is moderate to high. The total natural content of nitrogen is high, but nitrogen is slowly available to plants when the soils are wet and cold in spring. The content of available phosphorus is low, and content of available potassium is high. The natural content of lime is high.

Some areas of these soils are drained and are used for cultivated crops and vegetables. Undrained areas are used for permanent pasture and trees or are idle. Flooding and prolonged wetness are the main limitations to most nonfarm uses of these soils.

Representative profile of Warners mucky silt loam, in a wooded area 60 feet south of Farm Road, 3/4 mile east of Fly Road, and 1.3 miles north of Tag Road in the town of Sullivan:

A11—0 to 4 inches; very dark brown (10YR 2/2) mucky silt loam, dark gray (10YR 4/1) dry; strong fine granular structure; very friable; many fine roots; neutral; clear smooth boundary.

A12—4 to 25 inches; very dark grayish brown (10YR 3/2) silt loam; common medium distinct reddish brown (5YR 4/4) mottles and few fine distinct yellowish red (5YR 5/6) mottles in lower part; moderate medium granular structure; friable and slightly sticky; common fine roots in upper part; common fine and medium pores; few whitish marl flecks; weakly calcareous; mildly alkaline; clear smooth boundary.

C1g—25 to 28 inches; very dark gray (10YR 3/1) mucky silt loam; many medium distinct dark red (2.5YR 3/6) mottles; massive; firm in place, friable when removed; few fine and medium pores; few remnant fibers; remnant whitish shells; strongly calcareous; moderately alkaline; abrupt smooth boundary.

IIC2—28 to 70 inches; light gray (10YR 7/2) marl grading to gray (10YR 6/1) at a depth of 50 inches; common fine strong brown (7.5YR 5/8) fiberlike mottles in upper part; massive; friable; many shell remnants and few quartz grains; strongly calcareous.

Depth to marl or to reprecipitated calcium carbonate nodules ranges from 10 to 32 inches. Depth to bedrock is more than 5 feet. Coarse fragments are few or absent. Reaction of the mineral soil above the marl is neutral or mildly alkaline near the surface and is more alkaline with increasing depth.

Some areas have an Ap horizon. The A1 or Ap horizon has hue of 10YR, value of 2, and chroma of 1 or 2. Structure is moderate or strong granular. Consistence is friable or very friable.

Many areas have a Cg horizon instead of an A12 horizon. The Cg horizon is loam, silt loam, or light silty clay loam. It has hue mostly of 10YR, but hue ranges to 7.5YR. Value is 3 or 4, and chroma is 1 or 2. High chroma mottles generally are present. Structure is granular, or the material is massive. Shell fragments and marl flecks commonly are present. The C1g horizon is similar to the A12 horizon.

The IIC horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2. The marl material commonly has many shell remnants and some quartz grains.

Warners soils formed in deposits similar to those in which the moderately well drained Weaver soils formed. Warners soils commonly are near Martisco soils. They have drainage similar to Martisco soils but have a mantle of mineral soil that overlies marl, unlike Martisco soils which have a mantle of organic material that overlies marl.

Wk—Warners mucky silt loam. This soil is nearly level and formed in silty alluvial sediment that overlies deposits of marl. It is on the lake plain and in a few valley bottoms along streams that have a high content of calcium carbonate that issue from areas of limestone and alkaline shale. Slopes range from 0 to 3 percent but are mostly less than 1 percent.

Included with this soil in mapping are small areas of Martisco soils. Also included are a few areas of soils that are similar to this Warners soil but are somewhat poorly drained and poorly drained in slightly higher positions on the landscape. A few small areas of soils that have thin organic layers underlying the mineral surface layer are also included.

If undrained, this soil is suited to water-tolerant trees and grasses but is not suited to cultivated crops. Drainage is not feasible in some areas because of the lack of suitable outlets and because the underlying marl is a poor medium for root development. If drainage is installed, however, lowering the adjacent streambed and diking to protect from flooding are required in some places. If drained, this soil is easy to till and is suited to many row crops and some vegetable crops.

The hazard of flooding, prolonged wetness, and marly texture in the substratum are limitations to the use of this soil for nonfarm purposes. Some areas have potential for development of wetland wildlife habitat or as a source of lime for agricultural use. Capability subclass IVw.

Wassaic series

The Wassaic series consists of moderately deep, well drained and moderately well drained soils. These soils formed in a thin mantle of glacial till that overlies limestone bedrock. They are nearly level to sloping and are on the low upland plateau mostly at an elevation of less than 1,150 feet.

In a representative profile the surface layer is dark brown silt loam 8 inches thick. The subsurface layer is leached, brown gravelly silt loam 2 inches thick. The upper part of the subsoil is friable, dark reddish brown gravelly heavy silt loam 8 inches thick that has thin coatings of leached brown silt loam and the lower part is firm, reddish brown gravelly light silty clay loam 11 inches thick. Jointed, gray limestone is at a depth of 29 inches.

A seasonal high water table commonly is in the lower part of the subsoil for very brief periods in spring, especially in less sloping areas. Where present, the water table is perched above the slightly firmer substratum or above the bedrock. Hard bedrock is at a depth of 20 to 40 inches. Permeability is moderate in the surface layer and moderate or moderately slow in the subsoil. Roots generally can penetrate the 20- to 40-inch thick zone above the bedrock. Available water capacity is mainly moderate, but it is low where the depth to bedrock is about 20 inches. The natural content of nitrogen is medium, natural supply of phosphorus is low, and content of available potassium is high. The natural supply of lime is medium to high.

Many areas of these soils are used for cultivated crops and hay. Some areas, especially the more sloping areas are used for pasture or trees. Moderate depth to bedrock is the main limitation to nonfarm uses of these soils.

Representative profile of Wassaic silt loam, 3 to 8 percent slopes, in a hayfield 50 feet east of County Route 25 and 1 mile south of Clockville in the town of Lincoln:

Ap—0 to 8 inches; dark brown (7.5YR 4/2) silt loam, rubbed; weak medium and fine granular structure; friable; many fine and common medium roots; 10 percent coarse fragments; slightly acid; abrupt smooth boundary.

A2—8 to 10 inches; brown (7.5YR 5/4) gravelly silt loam; weak medium and fine subangular blocky structure; friable; many fine and few medium roots; many fine vertical pores; few areas of material from a remnant B horizon; 15 percent coarse fragments; slightly acid; gradual wavy boundary.

B&A—10 to 18 inches; dark reddish brown (5YR 3/3) gravelly heavy silt loam; weak medium and fine subangular blocky structure; friable; many fine roots; many fine pores; brown (7.5YR 5/2) coatings of silt loam more than 1 millimeter thick on faces of peds; few clay linings in pores in ped interiors; 15 percent coarse fragments; slightly acid; gradual wavy boundary.

B2t—18 to 29 inches; reddish brown (5YR 4/3) gravelly light silty clay loam; moderate medium subangular blocky structure; firm; common fine roots in upper part; many fine pores; thick clay films on most faces of peds and in pores; 20 percent coarse fragments; neutral; abrupt wavy boundary.

IIR—29 inches; gray (10YR 5/1) hard limestone bedrock; vertical joints filled with soil material similar to B horizon above.

Depth to bedrock ranges from 20 to 40 inches. The thickness of the solum is about the same or is slightly less. Carbonates are present in profiles that have a substratum. Coarse fragments are mainly limestone. They make up 0 to 35 percent, by volume, of the soil material, and the percentage increases with increasing depth. Reaction in the solum ranges from medium acid to neutral.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2.

The A2 horizon has a fine earth texture that ranges from fine sandy loam to silt loam. Some areas do not have an A2 horizon.

The B&A horizon ranges from fine sandy loam to light silty clay loam, and gravelly analogues are common. The B portion of the B&A horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 3 or 4. The A portion, on faces of peds, has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3. Structure is weak or moderate. Consistence is friable or firm.

The Bt horizon ranges from heavy fine sandy loam to light silty clay loam, and gravelly analogues are common. High chroma mottles are present in some profiles. The Bt horizon has color similar to that of the B portion of the B&A horizon. Structure is medium or coarse subangular blocky. Some areas have a thin, firm C horizon.

The R horizon, or bedrock, is gray or dark gray hard limestone that has common vertical joints and solution channels.

Wassaic soils commonly are near Honeoye and Farmington soils. They are similar to these soils, but they are shallower to bedrock than Honeoye soils and are deeper to bedrock than Farmington soils.

WmA—Wassaic silt loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, except mottles commonly are in the lower part of the subsoil. Slopes are slightly convex, and in places they have short, sharp breaks caused by underlying bedrock ledges. This soil commonly receives runoff from higher adjacent soils. It is mostly moderately well drained, especially in level areas.

Included with this soil in mapping are a few small areas of shallow Farmington soils where bedrock ledges are close to the surface. Also included are a few small areas of rock outcrop and a few areas of soils that are underlain by shale bedrock. A few small depressional areas of soils that are similar to this Wassaic soil but are less well drained are also included.

This soil is suited to cultivated crops, hay and pasture, and trees. Temporary seasonal wetness slightly delays normal tillage operations in spring in some years. Randomly placed subsurface drains are difficult and somewhat impractical to install because of the nearness of bedrock to the surface. Droughtiness is a slight problem in midsummer, especially where depth to bedrock is less than 25 inches. Tillage generally is not difficult, except stones and the included rock outcrops hinder tillage in some places.

Depth to bedrock and temporary seasonal wetness are limitations to some nonfarm uses. Because of the joints and solution channels in the bedrock, pollution of the ground water from septic effluent or other waste is a hazard. Capability subclass IIs.

WmB—Wassaic silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. Slopes are slightly convex. In places the slopes have low escarpmentlike relief caused by the underlying bedrock ledges. This soil receives runoff from higher adjacent soils. It is mostly well drained, but in a few areas it is moderately well drained.

Included with this soil in mapping are a few areas of shallow Farmington soils and very shallow soils along the edge and face of short escarpments. Also included are a few small areas of rock outcrops and soils on short, steeper slopes. A few areas of soils that are underlain by shale bedrock are also included.

This soil is suited to cultivated crops, hay and pasture, and trees. The hazard of erosion is slight, and erosion should be controlled to preserve the moderately deep soil mantle. Minimum tillage, use of cover crops, and contour tillage are practices that help to control erosion. Droughtiness is a slight problem on the shallow included soils and in places where soil depth is less than 25 inches. Tillage is slightly difficult in areas that have short escarpments and in small included areas where bedrock is at or near the soil surface.

Depth to bedrock and occasional temporary seasonal wetness are limitations to most nonfarm uses. Some areas have potential for recreational development or as stone quarries. Pollution of the ground water from septic effluent and other waste is a hazard. Capability subclass IIe.

WmC—Wassaic silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, except the depth to bedrock is slightly less. It commonly is on valley sides, and receives runoff from higher adjacent soils. Some areas of this soil have a stairstep appearance caused by the underlying bedrock ledges.

Included with this soil in mapping are some areas of soils that have slopes of 15 to 25 percent. A few areas of shallow Farmington soils along the face of short escarpmentlike slopes, a few outcrops of rock, and a few areas of soils that are underlain by shale bedrock are also included.

This soil is suited to some cultivated crops, hay and pasture, and trees. The hazard of erosion is moderate in cultivated areas. Contour tillage, use of cover crops, and stripcropping where it is practical help to preserve the moderately deep soil mantle. Droughtiness is a slightly greater problem on this soil than on less sloping phases of Wassaic soils, because runoff is more rapid. The operation of heavy equipment is difficult on stairstep slopes and where there are included areas of rock outcrop and moderately steep soils.

Depth to hard bedrock and slope are the major limitations to most nonfarm uses. Some areas have potential as rock quarries. Capability subclass IIIe.

Wayland series

The Wayland series consists of deep, poorly drained and very poorly drained soils that formed in silty alluvial deposits. These nearly level soils are on low flood plains along many streams throughout the county.

In a representative profile the surface layer is very dark grayish brown silt loam 9 inches thick. The subsoil is friable, mottled, dark gray and gray silt loam 29 inches thick. The substratum, to a depth of 61 inches, is very friable, dark gray fine sandy loam.

These soils usually are flooded annually. Flooding generally occurs in spring. Depth to the water table is somewhat regulated by the water level in the adjacent stream. The water table is near the surface for long periods during the year. Permeability is slow in the subsoil and upper part of the substratum. Rooting depth is mainly limited to the surface layer, but some roots extend more deeply as the water table recedes in summer. Available water capacity is high. The total content of nitrogen is high, but nitrogen is released slowly to plants in spring when the soils are damp and cold. The natural content of available phosphorus is low to medium, and content of available potassium is high. The natural content of lime is medium to high.

These soils remain in native vegetation, are idle, or are used for permanent pasture. Flooding and prolonged wetness are the main limitations to nonfarm uses of these soils.

Representative profile of Wayland silt loam, in an idle pasture 80 feet east of State Route 13 and 1/4 mile south of Cobb Hill Road in the town of Cazenovia:

A1—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine and medium granular structure; friable; many fine roots; slightly acid; clear smooth boundary.

B1g—9 to 20 inches; dark gray (10YR 4/1) silt loam; few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate coarse prismatic structure parting to weak fine subangular blocky; friable; few fine roots in upper part; common fine pores; neutral; clear smooth boundary.

B2g—20 to 38 inches; gray (10YR 5/1) silt loam; common medium and coarse distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; friable; few fine pores; thin patchy clay linings in pores; neutral; abrupt smooth boundary.

IIC—38 to 61 inches; dark gray (10YR 4/1) fine sandy loam; few fine distinct olive (5Y 4/3) mottles; massive; friable; porous; 12 percent fine coarse fragments, size and amount of fragments increase with increasing depth; weakly calcareous at a depth of 52 inches; mildly alkaline grading to moderately alkaline.

Depth of the silty mantle to coarser textured deposits ranges from 36 to more than 60 inches. Carbonates generally are at a depth of 30 to 60 inches. Depth to bedrock is more than 5 feet. Coarse fragments are few or absent above the IIC horizon. Reaction is medium acid to neutral in the solum and commonly is neutral to moderately alkaline in the IIC horizon.

Some areas have an Ap horizon. The A1 or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Structure is moderate or strong granular.

The B horizon is silt loam or light silty clay loam. Some profiles have very thin strata of fine sand. The B horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 1 or lower. High chroma mottles generally are present. Structure is weak or moderate subangular blocky or prismatic. Some areas have a C horizon instead of a B horizon. Structure of the C horizon is very weak, or the material is massive.

The IIC horizon ranges from fine sandy loam to silt loam or is stratified. Gravel content ranges from 5 to 30 percent. The IIC horizon has color similar to that of the B or C horizon. Consistence is friable to very friable. Some areas do not have a IIC horizon.

Wayland soils in Madison County have weak structure, which is not in the range defined for the Wayland series. This difference, however, does not affect the use and management of the soils.

Wayland soils are in a drainage sequence with the well drained Hamlin soils and the moderately well drained and somewhat poorly drained Middlebury and Teel soils. Wayland soils are similar to Warners soils but are not underlain by marly material, unlike those soils.

Wn—Wayland silt loam. This is a nearly level, silty soil. It is in low areas and slack water areas on flood plains. Slopes range from 0 to 3 percent but are mostly less than 1 percent.

Included with this soil in mapping are a few narrow areas of moderately well drained and somewhat poorly drained Teel and Middlebury soils adjacent to stream channels. Also included is a soil that has a surface layer of silty clay loam. This included soil is in a few slack water areas on the lake plain, where stream gradient is low. Soils that are similar to this Wayland soil but are medium acid or strongly acid in the upper part of the profile are also included in a few of the upland valleys in the southern part of the county.

In undrained areas this soil is suited to water-tolerant native vegetation and poor quality pasture. Drainage generally is difficult to establish and a combination of practices generally is required. These practices include lowering the adjacent streambed, diking to protect the soil from flooding, use of grassed waterways, and installation of interceptor drains to divert runoff from adjacent higher areas. If properly drained, this soil is easy to till and is suited to intensive use for cultivated crops. Many fields are small because of stream channels and remnant stream meanders that dissect many areas of this soil.

Flooding and prolonged wetness are limitations to the use of this soil for nonfarm purposes. Some areas have potential as sites for large ponds or for development of wetland wildlife habitat. Some areas are more suitable for use as open space corridors than for other uses. Capability subclass IVw.

Weaver series

The Weaver series consists of deep, moderately well drained soils. These soils formed in silty alluvium derived from glacial drift that has a high content of lime. They are nearly level and are on flood plains traversed by streams that have a high content of calcium.

In a representative profile the surface layer is dark grayish brown silt loam 9 inches thick. The subsoil is friable, mottled, brown silt loam 11 inches thick. The upper part of the substratum is friable, dark grayish brown heavy silt loam 14 inches thick. It is underlain by a buried surface layer of very dark gray silt loam 8 inches thick. The lower part of the substratum, to a depth of 58 inches, is pinkish gray marl and secondary lime nodules (fig. 11).

Many areas of these soils are flooded annually. Some areas are flooded only once in 5 to 10 years. A temporary seasonal high water table is in the lower part of the subsoil in spring. Depth to the water table is somewhat regulated by the water level in the adjacent streams. Permeability is moderate throughout the soil. Root penetration is somewhat restricted by the water table, but some roots extend more deeply as the water table recedes late in spring. Available water capacity is high. The natural supply of nitrogen is medium to high. Content of available phosphorus is low, and content of available potassium is high. The natural content of lime is very high.

Many areas of these soils are used for row crops and hay and pasture crops. Some areas, mostly where access is difficult, are idle or are wooded. Hazard of flooding is the main limitation to nonfarm uses of these soils.

Representative profile of Weaver silt loam, in a pasture 2 miles north of Merrillsville and 60 feet west of Creek Road, along Cowaselon Creek in the town of Lincoln:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; weak coarse subangular blocky structure parting to moderate fine and medium granular; friable; many fine and medium roots and few large roots; mildly alkaline; clear smooth boundary.

B2—9 to 20 inches; brown (10YR 4/3) silt loam; few fine faint brown (7.5YR 4/4) and distinct light gray (10YR 7/2) mottles in lower part; weak coarse and medium subangular blocky structure; friable; many fine and common medium roots; many fine pores; few light gray (10YR 6/1) marl flecks; few thin clay flows in some pores; moderately alkaline; gradual wavy boundary.

C1—20 to 34 inches; dark grayish brown (10YR 4/2) heavy silt loam; common medium distinct reddish brown (5YR 5/3) and few fine distinct yellowish red (5YR 4/6) mottles; massive; friable and slightly sticky; common fine roots in upper part; common fine pores; common light gray (10YR 7/2) marl flecks and few lime nodules; discontinuous layer that is 40 percent marl and nodules and that is 2 to 4 inches thick in the lower part; strongly calcareous; moderately alkaline; abrupt wavy boundary.

A1b—34 to 42 inches; very dark gray (10YR 3/1) silt loam; few fine distinct yellowish red (5YR 4/6) mottles; weak coarse subangular blocky structure; friable; common fine pores; few pinkish gray (5YR 7/2) marl flecks; many woody fibers; few thick woody fragments; strongly calcareous; moderately alkaline; abrupt wavy boundary.

C2—42 to 44 inches; very dark gray (5YR 3/1) loam; 50 percent pinkish gray (5YR 7/2) marl and lime nodules; common woody fibers; strongly calcareous; moderately alkaline; abrupt smooth boundary.

IIC3—44 to 58 inches; pinkish gray (5YR 7/2) secondary lime nodules (pebble size); can be cut with knife; some reddish yellow (7.5YR 7/8) outer stains.

The solum is 18 to 30 inches thick, and depth to bedrock is more than 5 feet. Hard coarse fragments generally are absent in the solum but make up as much as 5 percent of some profiles. Reaction is neutral to moderately alkaline in the lower part of the solum and the substratum. Soft marly material or lime nodules make up 0 to 10 percent of the solum and 20 to 50 percent of the substratum.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma mostly of 3. Low chroma mottles are in the upper 24 inches. Structure is weak or moderate.

The C1 horizon is silt loam or silty clay loam. It has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3. Mottles are few to many.

The A1b horizon has value of 2 or 3 and chroma of 1. Woody fragments are few to many. Some areas do not have an A1b horizon.

The C2 and IIC horizons, at a depth of more than 40 inches, consist of gravel-size lime nodules or marl. Some woody fragments are in the C2 horizon.

Weaver soils are in a drainage sequence with very poorly drained Warners soils. They formed in alluvium similar to that in which Teel and Middlebury soils formed but have a higher lime content than those soils and, unlike those soils, have lime nodules in the substratum.

Wv—Weaver silt loam. This soil is nearly level and formed in recent alluvium that contains reprecipitated lime nodules and marl. Slopes range from 0 to 3 percent. Because of the adjacent meandering stream, individual areas commonly are variable in shape.

Included with this soil in mapping are a few areas of soils that are similar to this Weaver soil but are somewhat poorly drained and poorly drained; these included soils are in depressions and along meander scars. Also included are a few areas of soils that consist mainly of lime nodules below a depth of 30 to 40 inches.

This soil is suited to cultivated crops, some vegetable crops, and hay and pasture crops. Only crops that can tolerate mild alkalinity should be grown. Temporary seasonal wetness or flooding slightly delays normal tillage operations in spring. This soil is easy to till at the proper moisture content. Using cover crops and including sod crops in the cropping system help to maintain good soil tilth and to protect the soil from flood scour. Where practical, installing drains for wet spots and land leveling improve many fields.

Flooding and temporary seasonal wetness are limitations to some nonfarm uses. Some areas are suitable for use as open space corridors. Capability subclass IIw.

Willette series

The Willette series consists of very poorly drained, well decomposed organic soils that are underlain by glaciolacustrine clay and silt at a depth of 16 to 51 inches. These nearly level soils are in low depressions on the lake plain and in a few small pockets on the upland plateau.

In a representative profile the surface layer is black muck (sapric material) 11 inches thick. The underlying organic layers are friable muck (sapric material) 15 inches thick that is black when rubbed. The substratum, to a depth of 60 inches or more, is mottled, gray silty clay loam and mottled, very sticky, gray silty clay.

In undrained areas the water table is at or near the surface throughout the year. Most undrained areas are ponded or flooded in spring. Permeability is rapid in the organic material and slow in the mineral soil substratum. Rooting depth in undrained areas is mainly confined to the surface layer. In drained areas, however, some roots extend to the top of the substratum. Available water capacity is high. The total content of nitrogen is high, but nitrogen is released slowly to plants when the soil is wet and cold. The supply of available phosphorus is very low, and content of potassium is low. The content of lime is medium to high.

On the lake plain, many areas of these soils are drained and are used for cultivated crops. Some areas are undrained and are in native species of water-tolerant trees and grasses. Flooding, prolonged wetness, and instability of the organic material are the main limitations to nonfarm uses of these soils.

Representative profile of Willette muck, in a cropped field 180 feet east of the end of Colton Road from its junction with Warners Road in the town of Lenox:

Oap—0 to 11 inches; black (N 2/0) broken face and rubbed sapric material (muck); 2 percent fibers, no fibers rubbed; weak fine granular structure; friable; few fine live roots; recognizable fibers are herbaceous; 20 percent mineral material; 2 percent woody fragments; medium acid; clear smooth boundary.

Oa2—11 to 23 inches; black (5YR 2/1) broken face and rubbed sapric material (muck); 10 percent fibers, no fibers rubbed; moderate coarse subangular blocky structure; friable; few fine live roots in upper part; fibers are mainly herbaceous; 40 percent mineral material; 10 percent woody fragments; medium acid; clear smooth boundary.

Oa3—23 to 26 inches; dark reddish brown (5YR 2/2) broken face sapric material (muck), black (5YR 2/1) rubbed; 15 percent fibers, no fibers rubbed; fibers are dark reddish gray (5YR 4/2) and have a mottled appearance; weak thin platy structure; friable; fibers are dominantly herbaceous; 20 percent mineral material; 10 percent woody fragments; slightly acid; abrupt smooth boundary.

IIC1g—26 to 29 inches; gray (5YR 5/1) silty clay loam; common medium prominent yellowish brown (10YR 5/6) and many medium faint dark gray (N 4/0) mottles; weak thin platy structure; sticky and plastic; few fine pores; neutral; clear smooth boundary.

IIC2g—29 to 60 inches; gray (N 5/0) silty clay; few horizontal layers of silt 2 inches thick below a depth of 45 inches; common large distinct yellowish brown (10YR 5/6) mottles; very weak thin platy structure; very sticky and very plastic; few fine pores; strongly calcareous at a depth of 42 inches; neutral grading to moderately alkaline.

Depth to the clayey substratum is 16 to 50 inches. Depth to bedrock is more than 8 feet. Woody fragments are mainly twigs, branches, bark chips, and logs and make up 0 to 25 percent, by volume, of the profile. Reaction in the organic material is medium acid to neutral. Recognizable fibers are mostly herbaceous, but woody fibers are also present.

In the surface layer (Oap or Oa1 horizon) hue is 10YR or the color is neutral, value is 2, and chroma is 0 to 2.

The organic subsurface layers are mainly sapric material but include layers of hemic material that have a total thickness of 6 inches or less. The mineral material is mainly silt and makes up as much as 50 percent of some sublayers. Hue is 10YR or 5YR or the color is neutral, value is 2 or 3, and chroma is 0 to 2. Structure is blocky or platy, or the material is massive.

The IIC horizon is silty clay loam or silty clay. Coarse fragments are few or absent. Hue is 5Y to 5YR, value is 4 or 5, and chroma is 0 to 2. Structure is platy, or the material is massive.

Willette soils commonly are near Palms soils. They are similar to Palms soils but have a finer textured mineral soil substratum than those

soils. Willette soils are shallower to mineral soil deposits than Carlisle soils.

Ww—Willette muck. This soil is nearly level and formed in organic material derived mostly from herbaceous plant remains. It has a fine textured mineral soil substratum. This soil is in low depressions and basins. Slopes are mostly less than 1 percent.

Included with this soil in mapping are a few small areas of deeper Carlisle muck. Also included are narrow bands of Fonda soils along the edge of some mapped areas and a few areas of soils that are adjacent to streams and have a thin mantle of silty alluvium overlying organic deposits.

If drained, this soil is well suited to vegetables and root crops. In many areas, however, artificial drainage is difficult to install because of the lack of suitable outlets. Subsurface tile drains do not function well in the slowly permeable substratum. In drained areas where the organic deposits are mainly less than 36 inches thick, this soil has a relatively short productive life because of oxidation losses, subsidence, and compression. Planting of windbreaks on field borders and using cover crops reduce the hazard of soil blowing. Heavy equipment can cause compaction and reduce permeability, thus adversely affecting the performance of drainage systems. Undrained areas produce poor quality native timber but provide cover for wildlife.

The prolonged high water table, flooding, instability of the organic material, and slow permeability in the substratum are limitations to most nonfarm uses of this soil. Some areas have potential for development of wetland wildlife habitat, for example, bird sanctuaries and waterfowl nesting areas. Capability subclass IVw.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops, pasture, and woodland, as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities, and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Description of the soils." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

General principles of soil management

RICHARD ACKERMAN, cooperative extension agent, helped prepare this section.

Some principles of management that are general enough to apply to all the soils suitable for crops in Madison County are discussed in this section. Management practices will be modified as knowledge of soils increases.

Soil fertility. Most of the soils in the county need applications of lime and fertilizer. The amount needed de-

pends on the natural content of lime and plant nutrients in the soil, on the needs of the crop, and on the level of yield desired. The natural supply of lime and nutrients can be determined by laboratory anaylsis and soil tests. Assistance in making and interpreting soil tests is available to farmers and others from the local Cooperative Extension Agent.

The average organic-matter content in the surface layer of mineral soils in Madison County is about 4 percent. The organic matter content of poorly drained and very poorly drained soils generally is somewhat higher than this. Nitrogen is released from organic matter, but most of it is in complex organic forms that plants cannot use. Therefore, it is necessary to apply nitrogen fertilizer to supplement nitrogen available in the soil.

Soils in Madison County generally are naturally low in their ability to supply phosphorus. The addition of appropriate amounts of phosphate in the form of commerical fertilizer is essential to obtain optimum crop yields. Most of the soils are low or medium in their ability to supply potassium. Soils that have a clayey subsoil, for example, Schoharie soils, are high in their ability to supply potassium, but these soils generally require application of fertilizer to obtain optimum yields of most crops.

Application of nitrogen and phosphorous fertilizer should be timely. Nitrogen is lost either through leaching from rapidly permeable soils, for example, Colonie soils, or by denitrification from less rapidly permeable soils, for example, Lockport soils. A small amount of nitrogen applied at frequent or timely intervals, for example, a small amount at planting and the rest as a sidedressing, generally gives the best results.

Current information that can be used as a guide in determining lime and fertilizer needs is available on request from the New York College of Agriculture at Cornell University, the local Cooperative Extension Service, the Soil Conservation Service, and private industry.

Soil tilth. Soil tilth significantly affects the germination of seeds, the ease of tillage, and the infiltration of water into the soil. Soils with good tilth are granular and porous. Most of the soils in Madison County are moderately high in organic-matter content, which is important for good soil tilth and fertility. The organic-matter content can be maintained by regularly adding animal manure, returning plant residue to the soil, including sod crops in the cropping system, and using cover crops and green manure crops.

Tillage tends to reduce the organic-matter content and break down soil structure. Therefore, tillage should be kept to the minimum necessary for seedbed preparation and weed control.

Soil drainage. On wet soils, for example, Canandaigua and Lyons soils, yields of cultivated crops can be increased by artificial drainage. Open ditches and tile drains are used to improve drainage. Compared with open ditches, tile drains cost more to install but generally require less maintenance, and the soil is easier to till. Artificial drainage of sloping soils, for example, Volusia channery silt loam, 8 to 15 percent slopes, is more effective if the ditches or tile lines are placed at a right angle to the direction of the slope. Whether tile drains or open ditches are used, suitable outlets are needed.

Soil erosion. Erosion is a principal source of sediment, which is a major cause of pollution. All soils are subject to erosion, but exposing the soil through cultivation or removal of vegetation greatly increases the hazard of erosion, especially on sloping to steep soils. On highly erodible soils, for example, Collamer silt loam, rolling, a cropping system that reduces runoff and erosion should be used in combination with other practices that control erosion. A cropping system is the sequence of crops grown and the use of certain management practices. These practices include minimum tillage, mulch planting, return of crop residue to the soil, using cover crops and green manure crops, and applying lime and fertilizer. Other practices that reduce erosion are contour farming, terracing, contour stripcropping, and the use of diversions and grassed waterways. Windbreaks help to reduce soil blowing.

The effectiveness of a particular combination of measures is different on different soils. The local representative of the Soil Conservation Service is available to assist in planning an effective combination of practices to reduce erosion.

Pasture can be used to control erosion on all but a few of the soils in Madison County. A high level of pasture management is needed on some of the soils to support a ground cover thick enough to prevent erosion. A high level of pasture management provides for fertilization, grazing control, and a careful selection of seeding mixtures. Grazing is controlled by rotating the livestock from one pasture to another, thus allowing time for regrowth of the plants. On some soils pasture plants should be established that require minimal renovation to maintain a good ground cover and to produce an adequate amount of forage.

Field crops. Corn for silage and grain is the dominant row crop grown in Madison County. Dry beans and sorghum are grown in a few areas. Soybeans have commercial potential if market and economic conditions are favorable.

Wheat and oats are the common close-growing grain crops. Barley and rye are produced in a few areas.

An alfalfa-grass mixture is the principal hay crop grown in the county. A birdsfoot trefoil-grass mixture commonly is grown on the acid soils that have a fragipan in the southern part of the county. Hay crops are more extensive than all the other field crops combined.

Special crops. In addition to the crops listed in table 3, a few special crops, for example, onions and potatoes, are significant to the agriculture of Madison County.

In 1974 about 1,100 acres of dry onions were planted and harvested (*15*). Onions are grown only on the drained organic soils (muckland) north of Canastota.

Although yields average more than 235 hundredweight per acre, they are somewhat lower than those in other

onion-producing areas of the State because of marl deposits underlying some of the soils, drainage problems, and the depth of muck deposits. Large areas of Martisco soils around the fringe of the muckland have a very thin organic mantle. Marl underlies these soils at a depth of less than 16 inches and commonly is mixed with the surface layer. The marl is a poor medium for root development, and the thin organic layers have a somewhat reduced available water capacity; thus, yields are lowered. Gravity drainage is adequate but removes excess water somewhat slowly early in spring. As a result, planting occasionally is delayed and crop growth is reduced. The generally shallow depth of the crop-producing muckland contributes to the drainage problem; in most areas the organic deposits are less than 2 1/2 feet thick. Also, compaction by heavy equipment reduces infiltration rates in many areas.

Potatoes are grown on organic and mineral soils. In 1974 they were grown on about 700 acres—500 acres on the Canastota muckland and 200 acres on coarse textured mineral soils. Yields average about 350 to 400 bushels per acre. Most of the potatoes grown in the county are sold as table stock on the fresh market.

Scab-resistant varieties of potatoes are required on soils that have a high content of lime, including not only mineral soils but also organic soils, for example, Martisco soils. Manganese deficiency is also a problem on high lime soils, particularly in areas where marl is mixed with the surface layer.

Most of the potatoes grown on mineral soils are grown on the sandier soils on the lake plain, for example, Colonie, Arkport, and Elnora soils.

Other special crops that have commercial potential in the county are apples, sweet corn, cabbage, tomatoes, asparagus, strawberries, and vine crops. According to the 1969 Census of Agriculture, about 200 acres in the county were in orchards, mainly apple orchards. The trend in recent years has been toward a slight increase in the acreage in commercial orchards. Sweet corn, cabbage, tomatoes, and asparagus are produced for fresh markets in nearby cities, for example, Syracuse and Utica.

There is also a limited processing market. According to the Census, about 800 acres was used for this kind of crop in 1969 and sweet corn accounted for the largest acreage. Because of soil conditions and climate, this kind of crop has commercial potential in some parts of the county.

Strawberries and vine crops, though not of importance at present, also have commercial potential. Deep, well drained, stone-free, sandy soils, for example, Colonie and Arkport soils, and upland soils, for example, Cazenovia and Honeoye soils, are suited to these crops but may require irrigation for optimum yields.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is indicated in table 2. All soils in the survey area

except those named at a level higher than the series are included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability classes I and II. Data in this table can be used to determine the farming potential of such soils.

The capability subclass is identified in the description of each soil map unit in the section "Description of the soils."

Yields per acre

R. CRAWFORD, conservation agronomist; J. MARTIN, district conservationist, Soil Conservation Service; and R. ACKERMAN, cooperative extension agent, Cooperative Extension Service, assisted in review of this section.

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 3. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 3.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

The estimated yields reflect the productive capacity of the soils for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 3 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Woodland management and productivity

MEREDITH A. PETERS, woodland conservationist, Soil Conservation Service, helped to prepare this section.

In Madison County about 191,400 acres, or 45 percent of the land area is classified as commerical forest (*14*) (fig. 12). This includes the farm woodlots.

The acreage in commercial forest types in the county is as follows: white pine and red pine, 14,400 acres (9,400 acres in plantations); oak, 11,000 acres; elm, ash, and red maple, 77,800 acres; maple, beech, and birch, 77,300 acres; and aspen and birch, 10,900 acres.

Table 4 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Map unit symbols for soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w*, indicates excessive water in or on the soil; *d*, restricted root depth; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: w, d, s, f, and r.

In table 4 the soils are also rated for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A

rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Wildlife habitat

ROBERT E. MYERS, wildlife biologist, Soil Conservation Service, helped to prepare this section.

Wildlife is a valuable resource in Madison County. There is a large population of white-tailed deer, ruffed grouse, grey squirrel, and cottontail. A medium to small population of wild turkey and snowshoe hare is in small areas in the southern part of the county.

Ringnecked pheasant mostly inhabit the lake plain in the northern part of the county; however, some pheasant inhabit intensively cropped valleys. Songbirds are abundant throughout the county.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 5, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, asters, goldenrod, dandelion, beggarweed, ragweeds, and pigweed.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of native plants are oak, poplar, cherry, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated *good* are autumn-olive and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, and wildrice and and rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Recreation

The soils of the survey area are rated in table 6 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 6 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 8, and interpretations for dwellings without basements and for local roads and streets, given in table 7.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Engineering

EDWARD A. FERNAU, senior soil engineer, New York State Department of Transportation, Soil Mechanics Bureau, helped to prepare this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 7 shows, for each kind of soil, the degree and kind of limitations for building site development; table 8, for sanitary facilities; and table 10, for water management. Table 9 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 7. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 7 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings

without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 7 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 8 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils

generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 8 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 9 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 11 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 9 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 11.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 10 soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 10 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Soil properties

EDWARD A. FERNAU, senior soil engineer, New York State Department of Transportation, Soil Mechanics Bureau, helped to prepare this section.

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 11 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 11 gives information for each of these contrasting horizons in a representative profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Description of the soils."

Texture is described in table 11 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 per-

cent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 14. The estimated classification, without group index numbers, is given in table 11. Also in table 11 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 12 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the representative profile of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates

that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 13 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 13 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of

bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Engineering test data

The results of analyses of engineering properties of several typical soils of the survey area are given in table 14.

The data presented are for soil samples that were collected from carefully selected sites. The soil profiles sampled are typical of the series discussed in the section "Description of the soils." The soil samples were analyzed by the New York State Department of Transportation, Soil Mechanics Bureau.

The methods used in obtaining the data are listed by code in the next paragraph. Most of the codes, in parentheses, refer to the methods assigned by the American Association of State Highway and Transportation Officials. The codes for shrinkage and Unified classification are those assigned by the American Society for Testing and Materials.

The methods and codes are AASHTO classification (M-145-49); Unified classification (D-2487); mechanical analysis (T88-57); liquid limit (T89-60); plasticity index (T90-56); moisture-density, method C (T99-57); shrinkage (D-427).

Engineering properties of geologic deposits

The kinds of geologic deposits in Madison County are glacial till, outwash, ice-contact, lacustrine, alluvial, and organic. The engineering significance of each kind of deposit is greatly influenced by the mode of deposition. Mode of deposition determines the texture and internal structure of the material. Position of the deposit on the landscape and position of the water table also influence engineering properties. In Madison County the geologic deposits are in the following categories: deep till deposits, shallow-to-rock deposits, stratified coarse-grained deposits, stratified fine-grained deposits, and organic deposits.

Deep till deposits. These deposits consist of an unstratified, highly variable mixture of all particle sizes ranging from rock fragments to clay. This material was scoured and transported from nearby sources by glacial ice and was deposited as ground moraine. Depth to bedrock generally is more than 5 feet, but in some small areas it is less. There are also a few rock outcrops. The rock and mineral fragments in the soil generally reflect the kind of bedrock in the immediate area.

Soils that formed in mixed deep till deposits are Alden, Appleton, Bath, Cazenovia, Chippewa, Conesus, Hilton, Honeoye, Lansing, Lima, Lyons, Mardin, Ontario Variant, Ovid, Stockbridge, and Volusia soils. These soils are the most dense and compact of the unconsolidated deposits in the county. Most of the till has been compacted by overriding ice. Deep till soils range from nearly level to steep but are mostly gently sloping and sloping. Because of the shape of the landscape, in many areas cut and fill earthwork is required for most construction uses. These soils generally provide a stable, relatively incompressible foundation for engineering works. Fill material from these deposits, if properly compacted, generally provides a stable embankment. Steep cut slopes commonly are subject to surface sloughing and erosion. In some areas where the Stockbridge and Howard soils are mapped as a soil complex, the Stockbridge soil is underlain by stratified coarse-grained deposits.

Shallow-to-rock deposits. These deposits consist of an unstratified mixture of glacial till or frost-fractured material that was deposited as a thin veneer over bedrock. The soils generally are 2 to 5 feet deep, and rock outcrops are common in some areas. The landforms and topography are bedrock controlled in most areas of these deposits.

Soils that formed over limestone bedrock are the Farmington and Wassaic soils. The Angola, Aurora, Camillus, Lairdsville, and Lockport soils formed in glacial till or in residuum that overlies shale. The Arnot, Lordstown, and Tuller soils formed over bedded sandstone, siltstone, and shale. Bedrock in Madison County is described in the section "Physiography and geology."

Soils that formed in shallow-to-rock deposits of glacial till or frost-fractured material generally have adequate foundation strength for light structures. The primary engineering concerns are related to the bedrock and ground water conditions. Because of the topography in some areas, cut and fill earthwork is necessary for extensive engineering works. Shale bedrock generally is softer and more deeply weathered than limestone, sandstone, or siltstone bedrock. Fill material is limited because of the nearness of bedrock to the surface. In some areas, particularly in areas underlain by limestone, the bedrock is quarried and is used as construction material.

Stratified coarse-grained deposits. These deposits consist of stratified material, mostly gravel and sand, that was sorted by glacial melt water. They are on outwash plains and terraces, alluvial fans, kame moraines, beaches and bars, and the coarser textured portions of deltas. The strata in these deposits range from well sorted to poorly sorted, and particle size ranges from cobbles to silt. These deposits generally are loose and porous.

Fredon, Halsey, Howard, Palmyra, Phelps, and Wampsville soils formed in gravelly outwash, kame, and beach and bar deposits. Chenango and Herkimer soils formed in coarse textured alluvial fan deposits. Arkport, Colonie, Elnora, Galen, Lamson, Minoa, Naumburg, and Wareham soils formed in sandy deltaic deposits.

Coarse-grained deposits generally have relatively high strength. Because they are loose and porous, they generally are not highly erodible but are subject to settlement when vibrated. The sandy deposits are susceptible to soil blowing if the topsoil is removed. Lamson and Minoa soils, which have a high content of fine sand and a seasonal high water table, are highly susceptible to frost action.

These deposits of gravel and sand have many uses in construction. Depending on gradation, soundness, and plasticity, they are used for many purposes, including the following:

1. Fill material for highway embankments.
2. Fill material for parking areas and other urban developments.
3. Fill material to decrease stress on underlying soils so that construction can proceed.
4. Sub-base for pavements.
5. Wearing surface for driveways, parking lots, and some roads.
6. Material for highway shoulders.
7. Free-draining backfill for structures and pipes.
8. Outside shell of water impoundments.
9. Slope blankets to drain and help stabilize wet cut slopes.
10. Sand and gravel for general use.

Stratified fine-grained deposits. These deposits consist of fine-grained lacustrine material that was transported by glacial melt water and deposited in still glacial lakes and ponds. Some of these deposits are flood plain soils that formed in more recent deposits in slack water areas. There are distinct layers, or laminae, mostly of silt- and clay-size particles. These deposits are mostly silt, but there generally is enough clay to make them plastic and sticky.

Lakemont, Fonda, Odessa, and Schoharie soils formed in deep, lacustrine silt and clay deposits. Elmwood and Swanton soils formed in a thin veneer of coarse-grained material that overlies silt and clay deposits. Canandaigua, Collamer, Niagara, and Raynham soils formed in the deep, silty parts of deltas. Hamlin, Middlebury, Teel, Wayland, and Weaver soils formed in alluvium on flood plains. Palms and Willette soils formed in organic material that is shallow to fine-grained deposits.

Because of their fine texture and high moisture content, these deposits have relatively low strength. They generally are highly compressible, and settlement may occur over a long period. The soils that have a high content of silt are less compressible, but they are highly erodible and are susceptible to frost action. Hamlin, Middlebury, Palms, Teel, Wayland, Weaver, and Willette soils are subject to flooding.

Soils that formed in fine-grained deposits are difficult to use for engineering works, especially level, wet soils that are subject to ponding, for example, Canandaigua soils. If soils that formed in these deposits are used as sites for embankments and for heavy structures or buildings, onsite investigation is required to determine the strength and settlement characteristics and the effects of ground water.

Organic deposits. These deposits consist mostly of accumulations of plant remains. In places they have a small amount of mineral soil. They are in very poorly drained depressions and bogs that are under water during part of the year.

Carlisle soils are deep organic soils. Edwards and Martisco soils overlie marl at depths that vary. Wallkill soils have a thin veneer of mineral soil that overlies organic material. Soils that formed in organic deposits are unsuitable for use as foundations because they are wet, have low strength, and are highly compressible. Generally the organic material should be removed to a depth at which there is suitable underlying material and should be replaced with suitable backfill. Adding fill material directly over organic deposits causes settlement to occur over a long period.

Formation, morphology, and classification of the soils

In this section, the major factors of soil formation and morphology are discussed. In addition, the system of soil classification currently used is explained and the soils of the county are placed in categories of that system.

Factors of soil formation

Soil is a natural, three-dimensional body at the earth's surface. It is the product of the interaction of five major soil-forming factors. These factors are parent material, topography, climate, plant and animal life, and time. The influence of climate and living organisms, the active forces of soil formation, and of time, are modified by local variations in parent material and topography. The relative importance of each factor varies from place to place. In some places one or two factors dominate and thus determine most of the properties of the soil.

Parent material

Parent material is the unconsolidated earthy mass in which soils form. It determines the mineralogical composition of soils and largely determines their chemical composition. Parent material also influences the color of soils and the rate of soil-forming processes.

Most of the soils in Madison County formed in different kinds of deposits that are the result of glaciation. Glacial till is the most extensive parent material. Less extensive are glaciolacustrine sediment, mixed till and residuum, glacial outwash, and a few other kinds of deposits. In ad-

dition, some soils are forming in recent stream alluvium and in accumulations of organic material.

Soils that formed in glacial till have widely varying characteristics. A dense fragipan and substratum are common in deep, acid soils in the southern part of the county. Mardin and Chippewa soils are examples. Also in this area are moderately deep and shallow soils that formed in a thin mantle of glacial till overlying sandstone and shale bedrock. Lordstown and Tuller soils are examples. The till parent material in the central part of the county has a medium to high content of limestone particles derived from the nearby limestone escarpment to the north. Soils that formed in this material, for example, Honeoye and Cazenovia soils, do not have a fragipan but have a calcareous substratum. The till deposits in the northern part of the county are strongly influenced by nearby beds of limestone and sandstone. Consequently, the soils that formed in these deposits have a sandy loam or loam texture and a calcareous substratum. Ontario Variant and Hilton soils are examples. Soils that formed in lacustrine sediment generally are free of stone and gravel fragments. Lacustrine soils, for example, Niagara and Odessa soils, are mostly on the lake plain in the northern part of the county. Examples of soils that formed in a mixture of glacial till and residuum are Camillus and Lairdsville soils, which are moderately deep to soft, weatherable, shale bedrock. Soils that formed in glacial outwash deposits generally are medium textured or moderately coarse textured and commonly are underlain by stratified deposits of sand and gravel. Howard and Palmyra soils are examples. Soils that formed in recent stream deposits along stream bottoms are called alluvial soils. They generally are quite silty and have little or no evidence of soil profile development. Hamlin and Wayland soils are examples. Muck soils, for example, Carlisle and Edwards soils, formed in organic deposits in low areas.

Topography

The shape of the land surface, the slope, and the position of the land surface in relation to the underlying water table have strongly influenced soil formation in Madison County. Soils that formed in convex, sloping areas where runoff is moderate to rapid generally are well drained and have a bright colored subsoil that is not mottled. These soils generally are leached to a greater depth than low-lying, wetter soils in the same general area. Soils that formed in more gently sloping areas where runoff is slow commonly have some evidence of wetness, for example, mottling in the subsoil. Soils that formed in level areas or in slight depressions where the water table is near the surface for long periods have strong evidence of wetness. These soils generally have a thick, dark colored, organic surface layer and a highly mottled or grayish subsoil. Soil wetness is caused by a high ground water table, position on the landscape that receives water from higher areas, or impervious layers in the subsoil or substratum. The length, steepness, and configuration of slopes also influence drainage and, consequently, the kind of soil that forms. Local differences in soils largely result from differences in parent material and topography.

Soils that formed in one kind of parent material but have different characteristics because of different degrees of wetness are said to be in a drainage sequence. Table 15 shows the relationships of parent material, position, and drainage of the soils in Madison County.

Climate

Climate—particularly temperature, precipitation, and frost-action—is one of the most influential soil-forming factors. It largely determines the kind of weathering processes that take place. It also influences the type of vegetation that grows and the leaching and translocation of weathered minerals.

Madison County has a humid, temperate climate that tends to promote the development of moderately weathered, leached soils. Although the average temperature increases slightly from the southern to the northern part of the county, variation in climate is not so great that it causes major differences among the soils. For more detailed information on climate, see the section "General nature of the county."

Plant and animal life

Living organisms—plants, animals, bacteria and fungi, and man—are important to soil formation. Plants generally are responsible for the amount of organic matter in the soil and the color and structure of the surface layer, and to some extent for the amount of nutrients. Animals such as earthworms and ants help to maintain soil porosity and improve its permeability to air and water. Animal waste causes aggregation of soil particles, which improves soil structure. Bacteria and fungi decompose plant remains, resulting in the release of nutrients for new plant growth.

The native forests of hardwoods and conifers in Madison County probably have had a greater influence on soil formation than any other organisms. Man has also influenced soil formation by clearing the forests and cultivating the land. He has added nutrients by applying fertilizer, mixed some soil horizons by plowing, and has transported soil material from place to place.

Time

In soil formation, time is required for various weathering processes to act on parent material, generally a long time. The soils of Madison County formed since the last glacier retreated from the area about 10,000 years ago.

Soils that formed on flood plains may receive more sediment each time the adjacent stream overflows. These soils are very young. They have indistinct soil structure, and the soil horizons have only slight differences in color. Teel soils is an example. Horizons in soils that have been forming since glaciation are much more distinct than those in Teel soils. Bath soils is an example.

Morphology of the soils

In this section, soil horizon nomenclature is explained briefly and the processes of soil horizon development are discussed.

Major soil horizons. The effects of the soil-forming factors can be distinguished in the different soil layers, or horizons. Most soils have three major horizons: the A, B, and C horizons (*12*). These major horizons are subdivided by the use of numbers and letters that indicate changes in a major horizon. For example, a B2t horizon is a layer within the B horizon that has an accumulation of translocated clay.

The A horizon is the surface layer. An A1 or Ap (plow layer) horizon is that part of the surface layer which has the highest content of organic matter. The A horizon is also the layer of maximum leaching or eluviation of clay and iron. An A2 horizon is the part of the A horizon in which considerable leaching has taken place. The A2 horizon, or subsurface layer, commonly is light brownish gray because of the removal of iron.

The B horizon underlies the A horizon and commonly is called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay and iron and other compounds that have been leached from the A horizon. In some soils the B horizon is by alteration in place instead of illuviation. The alteration is caused by oxidation and reduction of iron or by the weathering of clay minerals. The fragipan B horizon in some soils of the county formed by both illuviation and alteration in place. The B horizon commonly has blocky or prismatic structure. It generally is firmer and is lighter in color than the A1 or Ap horizon.

The C horizon is below the A and B horizons. It consists of parent material that is little altered by the soil-forming processes but is slightly weathered in some places.

Processes of soil horizon development. In Madison County, several processes affect the formation of soil horizons. These processes include accumulation of organic matter, leaching of salts and minerals, reduction and transfer of iron, translocation of silicate clay minerals, formation of soil structure, and change in soil density. These processes occur continuously at a very slow rate and commonly at the same time throughout the soil profile.

The accumulation of organic matter takes place when plants decompose. This process darkens the surface layer and helps to form the A1 horizon. In Madison County the average organic-matter content in the surface layer is about 4 percent.

For soils to develop distinct subsoil horizons, some of the lime and other soluble salts must be leached before other soil processes, for example, clay translocation, take place. Many factors affect this leaching, including the kinds of salts originally present, the rate and depth of soil solution percolation, and the texture of the soil.

Several of the well drained and moderately well drained soils in the county have strong brown, yellowish brown, or reddish brown subsoil horizons. These colors are caused mainly by thin coatings of iron oxides on sand and silt particles. However, in some soils, for example, Lairdsville soils, the color is inherited from reddish parent material. A bright colored subsoil that has iron oxide coatings commonly is termed a color B horizon. This horizon generally has subangular blocky structure but has little or no translocated clay from the surface horizon.

One of the more important processes of soil horizon development in many of the soils in Madison County is the formation and translocation of clay minerals. Clay particles are eluviated downward from the A horizon and are redeposited in the B horizon as films on faces of peds, as linings on the walls of pores and root channels, and as coatings on some coarse fragments. Honeoye soils is an example of soils in which the content is higher in the B horizon than in the A horizon because of translocation.

A fragipan has developed in the subsoil of some soils located in the southern part of the county. A fragipan is a very firm and brittle horizon when moist and is very hard when dry. The genesis of the fragipan is not fully understood. Swelling and shrinking that occur in alternating wet and dry periods may account for the dense packing of soil particles, the low pore space, and the gross polygonal pattern of vertical cracks found in most fragipans (*9*). Clay, silica, and oxides of aluminum are the most common cementing agents to cause brittleness and hardness. Soils that have a fragipan are associated with noncalcareous parent materials. The strength of a fragipan is best expressed in somewhat poorly drained and moderately well drained soils. Mardin soils, the most extensive soils in Madison County, have a very strong fragipan.

The reduction and transfer of iron compounds, or gleying, is mainly associated with wetter soils, for example, poorly drained Chippewa soils and very poorly drained Fonda soils. The grayish colors in the subsoil and underlying parent material indicate reduction and the removal and transfer of iron in solution. Moderately well drained and somewhat poorly drained soils have mottles which indicate some segregation of iron.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*16*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of

factors that affect soil genesis. In table 16, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol.* An example is Alfisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aqualf (*Aqu*, meaning water, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Ochraqualfs (*Ochr*, meaning light colored surface horizon, plus *aqualf*, the suborder of Alfisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Aeric* identifies the subgroup that is better aerated than is typical for the great group. An example is Aeric Ochraqualfs.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, mesic Aeric Ochraqualfs.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

General nature of the county

In this section general information about Madison County is given. History and development, farming and other land use, transportation, industry, community facilities, physiography and geology, drainage, water supply, and climate are discussed.

History and development

Among the earliest inhabitants of the survey area were the Oneida Indians of the Iroquois Confederation. They hunted in the area and grew corn, beans, and squash. The first settlement of colonists was established in about 1790 in the southeastern part of the area in what is now the town of Brookfield (*11*). Within 3 years the rest of the county was settled. Early in the nineteenth century, wheat, flax, and hops were grown and were transported eastward to larger markets. The population of the county rose rapidly and was 41,000 in 1840. Thereafter, the population declined slightly and then was stable for nearly a century. After 1940, the population again began to increase. In 1974 the population was about 64,000.

Madison County was established in 1806; before this it was part of Herkimer County. The county was named for James Madison, the fourth president of the United States.

Oneida is the only city in the county. Its population was 11,658 in 1970. Other areas that have a sizable population are the villages of Chittenango, Canastota, Cazenovia, and Hamilton. The county seat is Wampsville, a small community located between the city of Oneida and Canastota.

Farming and land use

Madison County has a large acreage of productive soils, favorable climate, and good market outlets for its agricultural products. According to the Bureau of Census, 236,101 acres, or 56 percent of the land area, was in active farms in 1960. This includes 141,314 acres of cropland, about 53,000 acres of pasture, and 41,622 acres of farm woodlots. Dairying is the principal farm enterprise.

A striking change in farming patterns and land use has occurred since 1945. From 1945 to 1969 the number of farms declined from 2,786 to 1,075. In the same period the average size of farms increased from 123 acres to 220 acres and the acreage in farms declined by almost 30 percent.

Before 1945 a wide variety of grain, vegetable, and orchard crops were grown. Buckwheat, snap beans, and apples are examples. Since that time, however, many crops have greatly declined in acreage, and crops that are closely associated with dairying are the principal ones grown. In 1969 hay was grown on 56,051 acres, corn on 24,922 acres, and oats on about 11,000 acres. Cash crops, for example, wheat, were grown on 17,420 acres. Special crops, for example, onions and potatoes, were grown on about 3,000 acres. About 10,000 acres was idle in 1969.

The second most extensive land use in the county is woodland. In 1967 about 150,000 acres was in woodland, not including farm woodlots. Some areas of the county have good stands of sugar maple, which is tapped for syrup.

Urban and recreation areas have rapidly increased in acreage and made up about 16,000 acres in 1974.

Industry, transportation, and community facilities

Most of the industry in Madison County is in the northern part, close to the major transportation routes. The principal manufactured goods are silver, plastic, paper, and precast concrete products and recreational and camping vehicles. Three large stone quarries are located along the Onondaga Limestone escarpment. Glacial outwash deposits in valley areas are the sites of numerous gravel pits.

The county has an extensive network of highways and roads. The New York State Thruway and U.S. Route 20 are major east-west highways, and several State roads provide north-south access. The main line of the Penn-Central Railroad crosses the northern part of the county, and the Lehigh Valley Railroad crosses the southeast corner. In earlier times the Erie Canal serviced the county, but it is now abandoned. Commercial airline service is available in Syracuse and Utica, which are within a short driving distance of the county's western and eastern borders. These cities also are market outlets for vegetables and dairy products.

Colgate University, Cazenovia College, and a branch of the State University of New York at Morrisville are institutions of higher education in the county. There are several parks, including two State Parks. Oneida Lake and several small manmade lakes provide excellent boating and fishing. In the southeast part of the county, large parcels of State-owned woodland have trails for horseback riding and hiking. Camp areas and other facilities for outdoor recreational activities are abundant.

Physiography and geology

BERNARD S. ELLIS, senior staff geologist, Soil Conservation Service, helped to prepare this section.

Madison County is within two of the major physiographic provinces of New York State (*4*). The northern quarter of the county is in the Ontario lowlands, or Oneida Plain, and the southern part is in the Appalachian Uplands.

The Ontario lowlands in Madison County extends from the shore of Oneida Lake southward to the Helderberg Escarpment. These lowlands have two subsections based on relief. The northern subsection is a low, nearly level, old glacial lakebed that has gently sloping beach ridges in some places. The southern subsection is more sloping and is composed of outwash terraces and lacustrine benches that are interspersed by low, till-covered hills.

The Helderberg Escarpment extends across Madison County. It is a steep, north-facing slope that has nearly vertical outcrops of exposed limestone bedrock in some places. The escarpment is the border between the low-lying plains and the plateau that forms part of the Appalachian Uplands.

The plateau is mature and eroded and is dissected by a series of valleys that are several hundred feet deep. The major valleys on the plateau have a north-south orientation. Like the lake plain, the plateau is divided into the low and high areas based on relief. The low plateau is characterized by rolling or undulating terrain and some areas of large drumlinlike hills and ridges. The high plateau is in the extreme southern part of the county and is characterized by large, rounded, bedrock-controlled hills and ridges. The nearly level hilltops are at a similar elevation. This reflects the nearly horizontal character of the underlying bedrock. Because of stream dissection and the deepening of valleys by glacial scour, the plateau uplands have a rugged, rolling appearance. The rounded shoulders of the hills and the steep lower valley sides also are indications of glacial modifications.

Elevation ranges from 368 feet above mean sea level at Oneida Lake to 2,142 feet at a point midway between Georgetown and Erieville in the southwestern part of the county.

In the flatter, northern part of the county, changes in relief are more gradual. For example, in the six miles from the shore of Oneida Lake to Canastota, the elevation increases only 50 feet. South of Canastota the changes in relief are more pronounced. Elevation at the base of the escarpment is about 850 feet, which is about 430 feet higher than elevation at Canastota.

The immediate area of the escarpment has the most pronounced relief in the county. Ground elevation rises more than 250 feet in a very short horizontal distance.

From the crest of the escarpment, which is at an elevation of 1,050 feet, to the southern part of the county , which is at an elevation of 2,142 feet, the change in relief is rather uniform (fig. 13). In the southern part relief is also the most pronounced. Here, hilltops commonly are 500 to 600 feet higher than the adjoining valley floor.

Madison County is underlain by bedrock of the Silurian and Devonian Periods (*3*) (see figure 13). Formations of the Middle to Upper Silurian Period underlie the Oneida Plain in the northern part of the county. The younger Devonian Formations underlie the upland plateau in the southern part of the county. The bedrock of both periods lies nearly flat, except it has a slight regional dip to the south of about 50 feet per mile (*10*).

The Middle Silurian Formations are the oldest formations in Madison County and are south of Oneida Lake. Herkimer Sandstone and Lockport Dolomite are the principal members of this group. In a few areas the dolomitic limestone is within a few feet of the surface. The principal members of the Upper Silurian Formations are Cobleskill Limestone, Camillus Shale, and Vernon Shale. The shale formations commonly are exposed in roadcuts

and in areas dissected by streams. Colors are distinctively red, green, or gray. The soil mantle overlying the soft shale commonly is moderately deep and semiresidual.

The bedrock of the Lower Devonian Period consists mainly of Onondaga and Coeymans Limestones. These formations make up a distinct east-west escarpment that crosses the county. Several areas have nearly vertical exposures of limestone. Extensive areas of shallow and moderately deep soils are just above the escarpment.

Bedrock of the Middle Devonian Period consists mainly of shale formations. These formations, called the Hamilton Group, include beds of Moscow, Ludlowville, and Marcellus Shales. Soils that formed in glacial till deposits above these formations have dull colors and a high content of dark shale and limestone fragments.

The Upper Devonian Formations are the youngest in the county. They include Tully Limestone, Ithaca Siltstone and Sandstone, and Geneseo Shales. The Tully Formation is thinner and lacks the distinct escarpment feature common to the Onondaga Limestone. The Upper Devonian Formations underlie the southern one-quarter of the county; in a few areas the bedrock is exposed. Soils that formed in parent material derived from these formations generally have a large content of channery fragments and flagstones.

Most of the soils in Madison County formed in parent material that was deposited as a result of glaciation. During the Pleistocene period, the survey area was completely covered by a continental ice sheet several hundred feet thick (*8*). Evidence indicates that the ice made at least two or more major advances in the survey area during this period. Before overriding the uplands, advance lobes of ice extended southward through the major valleys. As these advance lobes moved, they deepened, and widened the valleys. Eventually the ice sheet crept into the uplands and covered even the highest hills.

As the climate warmed and melting exceeded advance, the glacial ice began to recede. The areas first exposed were the uplands where the ice was thinnest. The mixture of rock fragments and finer particles left covering these areas is called glacial till. Its character generally is strongly influenced by the local bedrock from which it was derived. The thickness and shape of the till mantle are quite variable. On some hills the thickness of the till ranges from a few inches to a few feet. On some undulating ground moraines the till is tens of feet thick, and on the large drumlinlike hills the till is more than 100 feet thick. Glacial till deposits cover about 60 percent of the land area in the county. The extensive Mardin and Honeoye soils are examples of soils that formed in glacial till.

As the ice continued to melt and to recede, it exposed valley areas and a large quantity of melt water was discharged from the glacial front. The melt water deposited rock and soil debris as valley train terraces, kames, and eskers. Valley train deposits are on the floor of many valleys and form nearly level or undulating terraces. Kames are steep, rolling hills that result from deposits at the edge of the ice. Eskers result from deposits of subglacial streams. These proglacial fluvial deposits are known in general terms as outwash deposits and consist mainly of stratified sand and gravel. Howard and Palmyra soils are examples of soils that formed in these deposits.

During the last advance of the glacier, called the Valley Heads Substage, large recessional moraines formed (*6*). These moraines plugged many of the major valleys, for example, Stockbridge and Oriskany Falls Valleys. These moraines formed against the edge of the stagnant ice front. They generally consist of variable stratified deposits. The variability of the deposits is reflected by the Palmyra and Arkport soils that are mapped in complex in these areas.

As the glacier continued to retreat northward, melt water was trapped between the valley-blocking moraines and the ice front. Consequently, proglacial lakes formed in some valleys. In the still waters of these lakes, fine soil particles that were carried in suspension by the melt water were deposited. These glaciolacustrine (lake-laid) deposits occur as much as 400 feet above the floor of some valleys. The stone-free Schoharie soils formed in these deposits.

As the ice front receded further, it exposed the Ontario lowlands (Oneida Plain) north of the Appalachian Plateau. Here, a large proglacial lake formed and deposited large areas of silty and clayey lacustrine sediment and sandy deltaic deposits. Niagara, Odessa, and Galen soils are examples of soils that formed in these deposits.

One of the final lake stages, Lake Iroquois, was responsible for shallow water vegetation that resulted in extensive organic deposits (muck) north of Canastota (*5*). Palms and Edwards soils are examples of soils that formed in these organic deposits. Glacial till ridges on the Oneida Plain commonly formed the shorelines for the various glacial lake stages. Wave action reworked much of the till, thus making it coarser textured and sandier than it was originally. The Hilton and Appleton soils are examples of soils that formed in these till deposits on remnant ridges.

Under the freeze-thaw conditions that are common to immediate postglacial and periglacial periods, water-saturated till deposited on valley sides commonly flowed or slumped onto outwash deposits in the valley bottoms. This overriding and subsequent mixing of deposits produced soils that are in a variable pattern on the landscape. Stockbridge and Howard soils are mapped in complex in these areas.

The formation of alluvial fans is also associated with the high moisture regimes of immediate postglacial or periglacial periods. High gradient side streams that carried a large amount of soil and rock debris during these periods deposited this material where they entered lower gradient main valleys. Chenango soils formed in these alluvial fan deposits.

Silty alluvial sediment that is deposited along flood prone streams and the continuous accumulation of organic material in swampy areas are examples of more recent

deposits that are not associated with glaciation. These deposits cover about 7.5 percent of the land area in the county.

Drainage

There are three main types of streams in the county. In the northern third of the county, gradient is low and the streams meander across broad flood plains. In the escarpment area and in the upland areas of the southern two-thirds of the county, gradient is very steep, valleys generally are V-shaped, and alignment is relatively straight. In the major valleys in the southern two-thirds of the county, streams flow on mature flood plains, gradient is relatively low, and the alignment meanders over reworked flood plain deposits.

The principal drainage pattern in the county is dendritic. This pattern is somewhat modified in places by bedrock and by remnant glacial features.

The northern half of the county is drained to the north into Oneida Lake. From here, water flows into the Ontario-St. Lawrence Basin. The main north-flowing streams are Chittenango, Oneida, Canastota, and Cowaselon Creeks. The northern part of the town of Madison is drained to the northeast by Oriskany Creek, which joins the Mohawk River.

The southern half of the county is drained to the south by the Susquehanna River system. The principal south-flowing streams are the Unadilla, Chenango, and Otselic Rivers and Tioughnioga Creek.

Water supply

Madison County has two main sources of water for agricultural, industrial, and domestic use: ground water in wells and springs and surface water in streams and reservoirs. Ground water provides domestic water supplies for about one-third of the county's inhabitants. Two-thirds of the surface water is used to supply industrial and other commercial needs (*13*).

The county has problems of water quantity and quality. In the northern part of the county and in scattered areas in the southern part, hardness of the water and the presence of salt in the deeper bedrock wells are the main problems.

Pollution of surface water occasionally is a problem, but laws have been effective in reducing pollution.

Only a small percentage of the available ground water and surface water in the county is currently used, and the water supplies for future use in the county are ample.

Climate

Table 17 gives data on temperature and precipitation for the survey area, as recorded at Morrisville, New York, for the period 1951 to 1972. Table 18 shows probable dates of the first freeze in fall and the last freeze in spring. Table 19 provides data on length of the growing season.

In winter, the average temperature is 21 degrees F and the average daily minimum temperature is 11 degrees. The lowest temperature on record, which occurred at Morrisville on January 15, 1957, is −35 degrees. In summer, the average temperature is 60 degrees and the average daily maximum temperature is 76 degrees. The highest recorded temperature, which occurred on July 19, 1953, is 95 degrees.

Growing degree days, shown in table 17, are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 21 inches, or 55 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years in 10, the rainfall in April through September is less than 17 inches. The heaviest 1-day rainfall during the period of record was 4 inches at Morrisville on July 10, 1952. About 29 thunderstorms occur each year, and about 18 occur in summer.

Average seasonal snowfall is 110 inches. The greatest snow depth at any one time during the period of record was 44 inches. On the average, 45 days have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The percentage of possible sunshine is 65 in summer and 30 in winter. The prevailing wind is from the west-northwest. Average windspeed is highest, 11 miles per hour, in February.

Climatic data in this section were specially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

References

(1) American Association of State Highway [and Transportation] Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.

(2) American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(3) Broughton, J. G., Fisher, D. W., Isachsen, Y. W., Offield, T. W., and L. V. Rickard. 1962. The geology of New York State. N. Y. State Mus. and Sci. Serv., Geol. Surv., Map and Chart Ser. 5, 42 pp., illus.

(4) Cline, M. G. 1963. Soils and soil associations of New York. Cornell Ext. Bull. 930, 72 pp., illus.

(5) Coon, R. R. 1960. Surficial geology of the Syracuse East and Manlius, New York, 7.5 min. quadrangle. Thesis. 255 pp.

(6) Fairchild, H. L. 1932. Closing stage of New York glacial history. Abstr. Geol. Soc. Am. Bull. 43, pp. 191-92.

(7) Fever, R. Soil management groups in New York State. Cornell Misc. Bull. 61, 8 pp.

(8) Flint, R. F. 1971. Glacial and Quaternary geology. 892 pp., illus.

(9) Grossman, R. B. and F. J. Carlisle. 1969. Fragipan soils of eastern U.S. Adv. Agron., 21: 237-279, illus.

(10) Holmes, C. D. 1971. From Nelson to Chittenango: a geological journey. 25 pp., illus.
(11) Morath, G. S. 1969. Highway map of Madison County, New York. 2 pp.
(12) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962]
(13) United States Department of Agriculture. 1967. New York State inventory of soil and water conservation needs. 287 pp., illus.
(14) United States Department of Agriculture. 1970. The timber resources of New York. For. Serv. Res. Bull. NE-20, 193 pp., illus.
(15) United States Department of Agriculture. 1974. Special muckland and vegetable report. Stat. Rep. Serv., 2 pp.
(16) United States Department of Agriculture, Soil Conservation Service. 1975. Soil taxonomy. U.S. Dep. Agric. Handb. 436, 754 pp., illus.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	Less than 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	More than 5.2

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg

Channery soil. A soil, that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light textured) soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Compressible. Excessive decrease in volume of soft soil under load.

Congeliturbate. Soil material disturbed by frost action.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Delta. An alluvial deposit, commonly triangular in shape, formed largely beneath water and deposited at the mouth of a river or stream.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to

The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).
Corrosive. High risk of corrosion to uncoated steel or deterioration of

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action. Freezing and thawing of soil moisture. Frost action can damage structures and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by melt water as it flows from glacial ice.

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes by water originating mainly from the melting of glacial ice. Many are interbedded or laminated.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Because part of the fine clay in the B horizon of many soils has moved downward into the B horizon from the A horizon, the B horizon is called an illuvial horizon.

Imbrication. The directional orientation of rock fragments resulting from fluvial deposition or mass movement.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil; the depth to the water table; and the kind of water table that is present. Relative terms for expressing the rate of internal soil drainage are as follows: none, very slow, slow, medium, rapid, and very rapid.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. An area that consists mainly of low-lying, nearly level or undulating land that was partially under water during part of a glacial period. The lake plain in Madison County is part of the Ontario lowlands and is at a lower elevation than the upland plateau.

Landslide. The rapid downhill movement of a mass of soil and loose rock generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Lime, agricultural. A soil amendment that consists mainly of calcium carbonate but also includes magnesium carbonate and, in some cases, other material. Agricultural lime is used to furnish the essential elements calcium and magnesium for plant growth and to neutralize soil acidity.

Lime level. The content of lime in soils. The classes of lime levels are as follows:

High lime. A soil that is slightly acid to mildly alkaline in the upper part of the profile. Free lime (carbonates) is at a depth of 16 to 36 inches.

Medium lime. A soil that is strongly acid to neutral in the upper part of the profile and is slightly acid to mildly alkaline in the lower part to a depth of 36 inches or more. Free lime (carbonates) is at a depth of 36 to 48 inches.

Low lime. A soil that is very strongly acid to medium acid to a depth of 24 inches or more and is slightly acid to mildly alkaline to a depth of 48 inches or more. Free lime (carbonates) is at a depth of 48 to more than 60 inches.

Very low lime. A soil that is extremely acid or very strongly acid to a depth of 18 inches or more and is strongly acid or medium acid to

a depth of 48 inches or more. Free lime (carbonates) is at a depth of more than 60 inches.

Limestone. A sedimentary rock that has a high content of calcium carbonate or magnesium carbonate.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting loads.

Marl. Soft, whitish, unconsolidated calcium carbonate that generally is mixed with a varying amount of clay or other impurities.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material mixed with mineral soil material. The content of organic matter is more than 20 percent.

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Narrow-base terrace. A terrace no more than 4 to 8 feet wide at the base. A narrow-base terrace is similar to a broad-base terrace, except for the width of the ridge and channel.

Neutral soil. A soil having a pH value between 6.6 and 7.3.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by water that originated mainly from the melting of glacial ice. Glacial outwash is commonly in valleys on landforms known as valley trains, outwash terraces, eskers, kame terraces, kames, outwash fans, or deltas.

Outwash plain. A land form of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of subsurface tunnels or pipelike cavities in the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Polypedon. A volume of soil having properties within the limits of a soil series, the lowest and most homogeneous category of soil taxonomy. A "soil individual."

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Pore space. Total space not occupied by soil particles in a bulk volume of soil.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.005 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use or management.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or " very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Trace elements. The chemical elements in soils, in only extremely small amounts, essential to plant growth. Examples are zinc, cobalt, manganese, copper, and iron.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams emerging from hills or mountains and

spreading sediments onto the lowland as a series of adjacent alluvial fans.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within 1 year; specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Illustrations

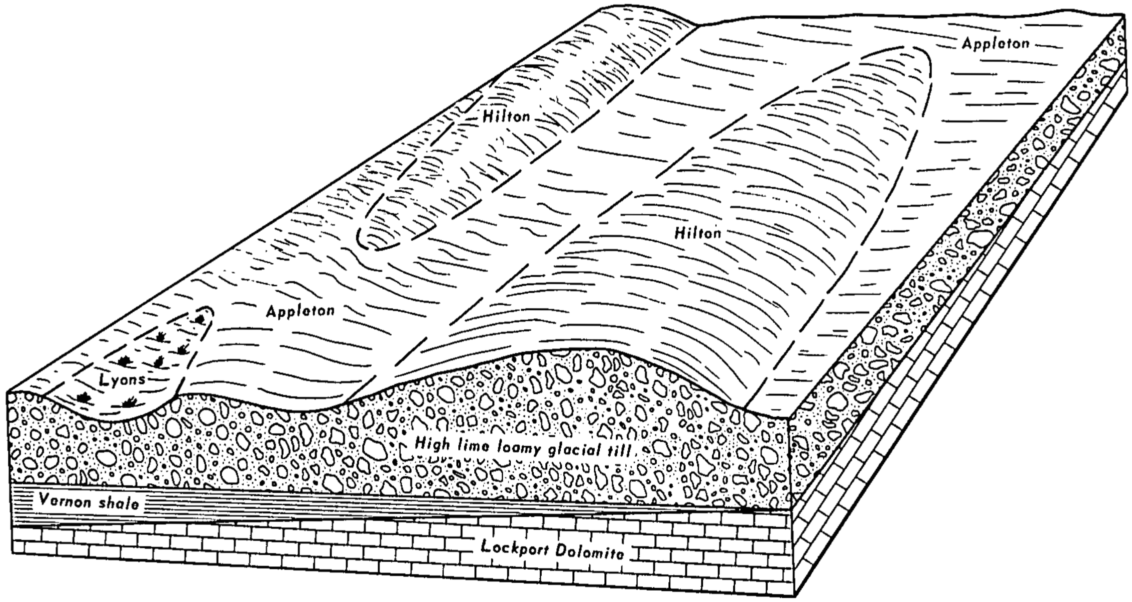


Figure 1.—Typical relationship of soils and underlying material in Hilton-Appleton, gently sloping.

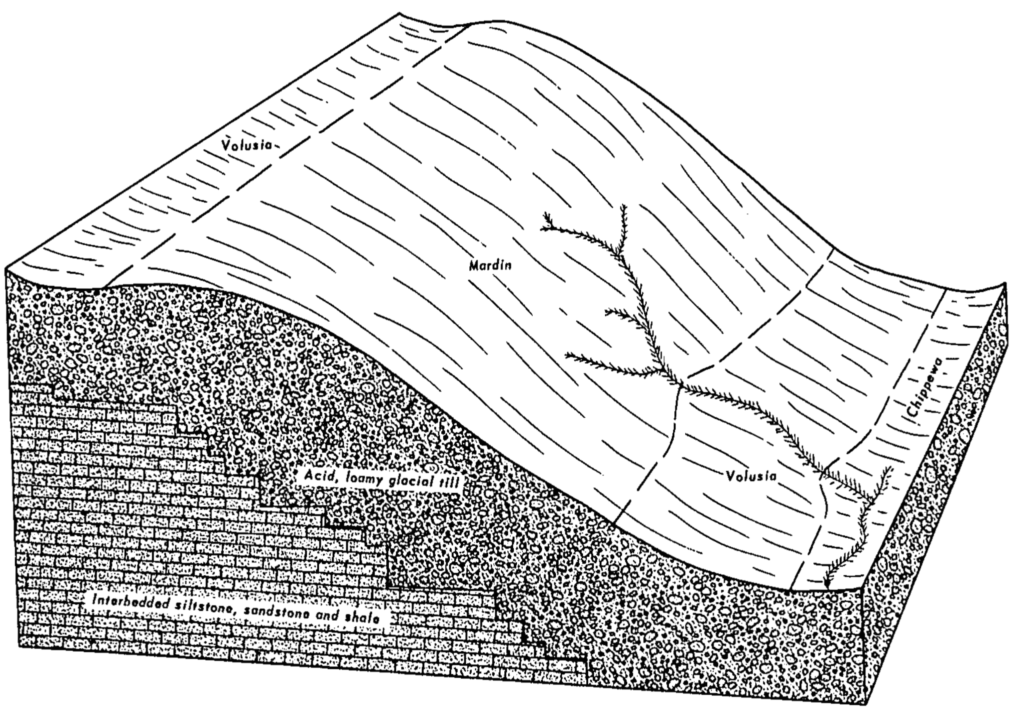


Figure 2.—Typical relationship of soils and underlying material in Mardin-Volusia, sloping.

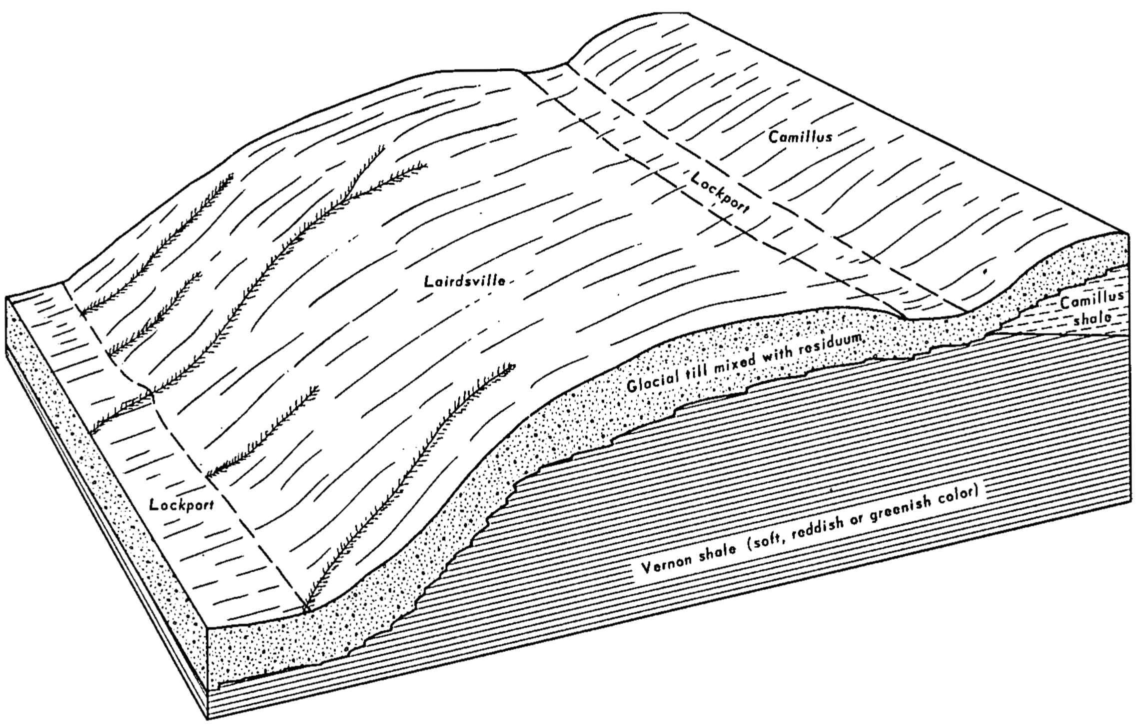


Figure 3.—Typical relationship of soils and underlying material in Lairdsville-Camillus-Lockport, gently sloping.

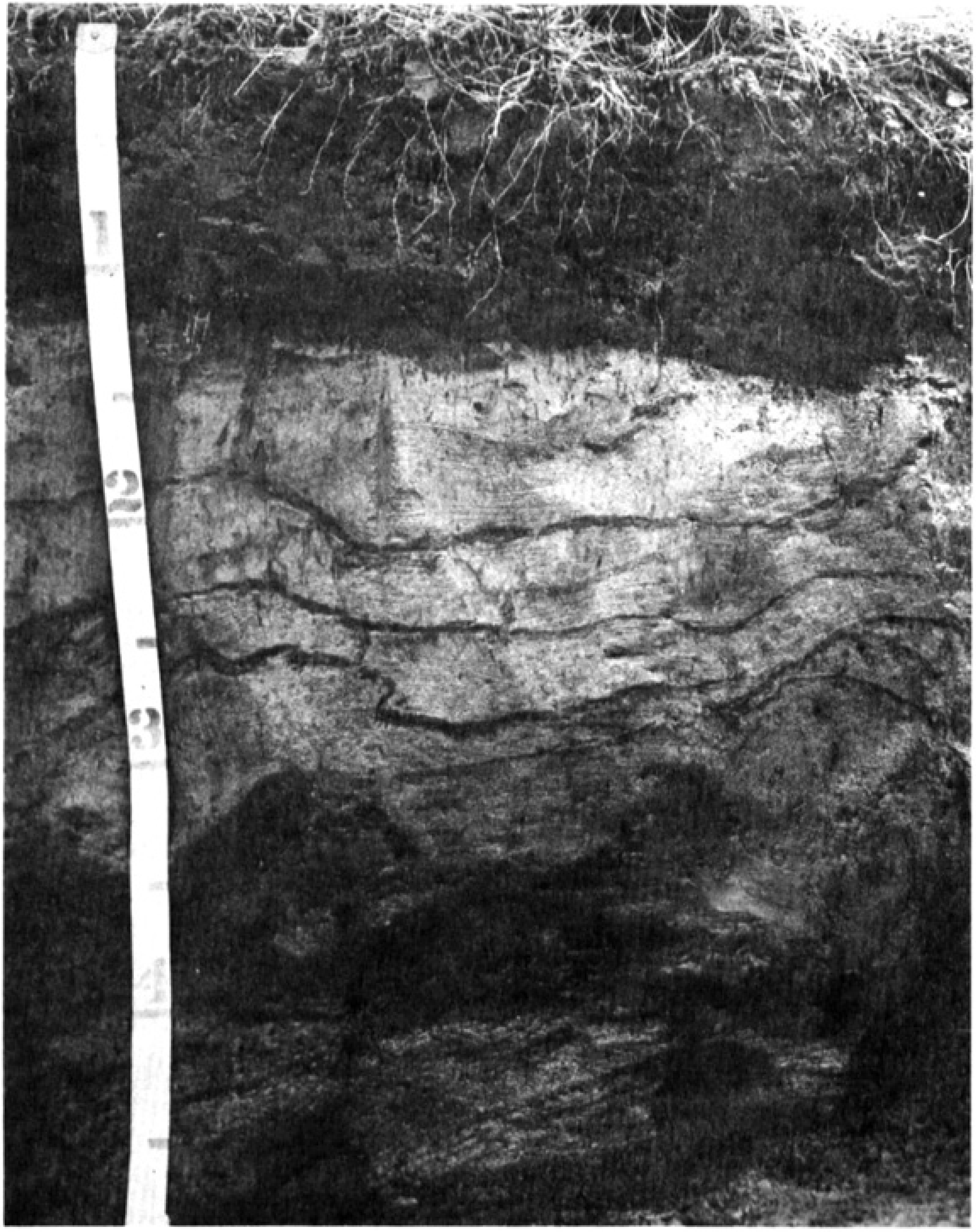


Figure 4.—The thickness of the subsoil bands on lamellae in sandy soils in Colonie-Arkport-Elnora, undulating, is important to water-holding characteristics.



Figure 5.—This photograph shows the typical drainage pattern on Schoharie-Collamer, gently sloping.

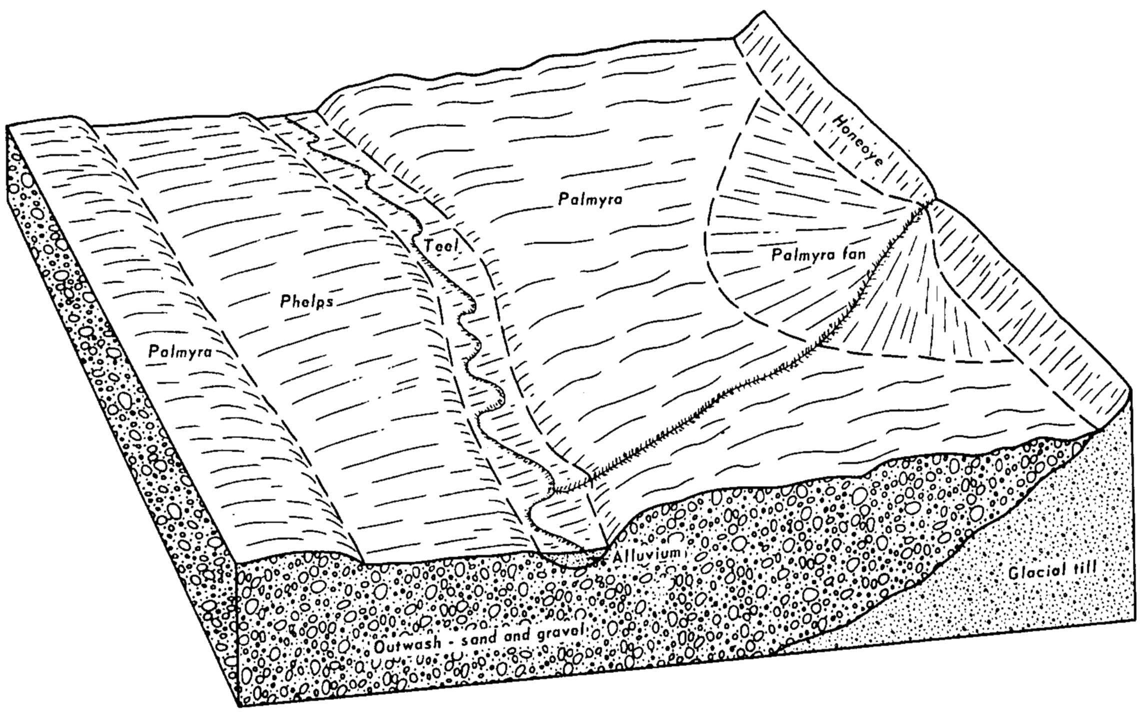


Figure 6.—Typical relationship of soils and underlying material in Palmyra-Phelps, undulating.

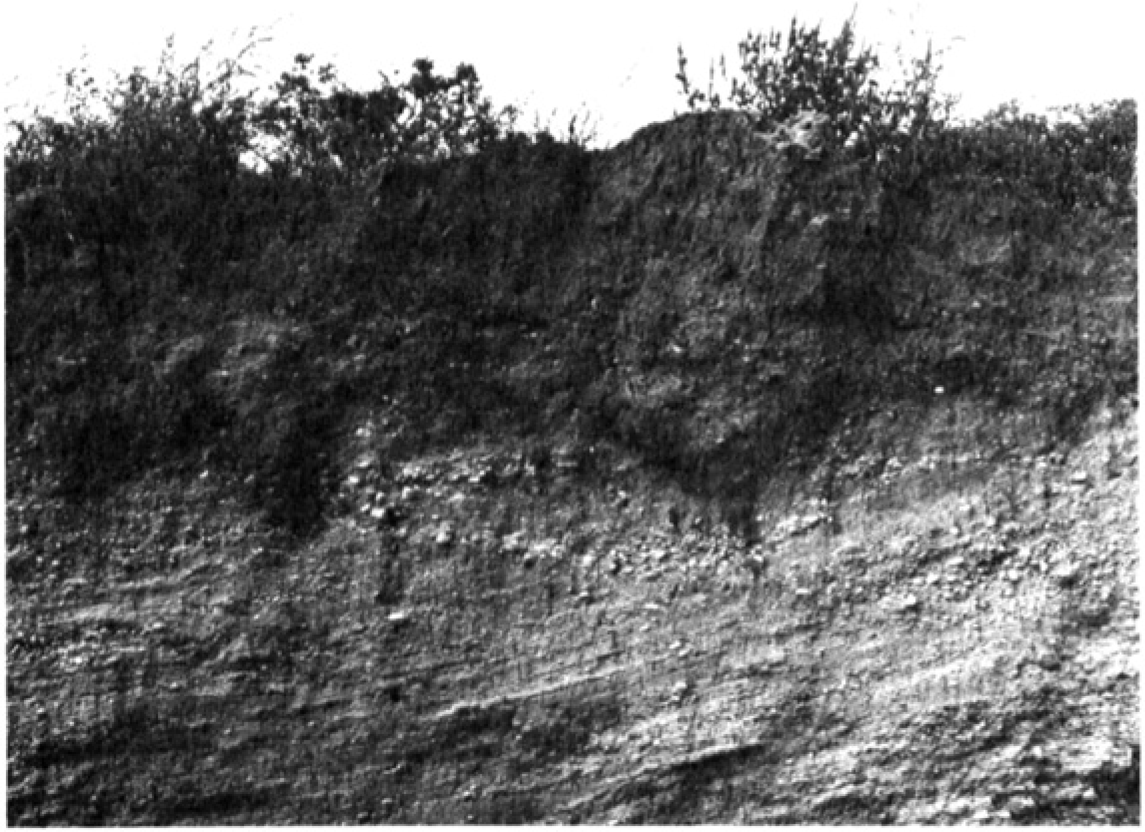


Figure 7.—The stratified deposits underlying Wampsville-Palmyra, undulating, provide a source of sand and gravel.

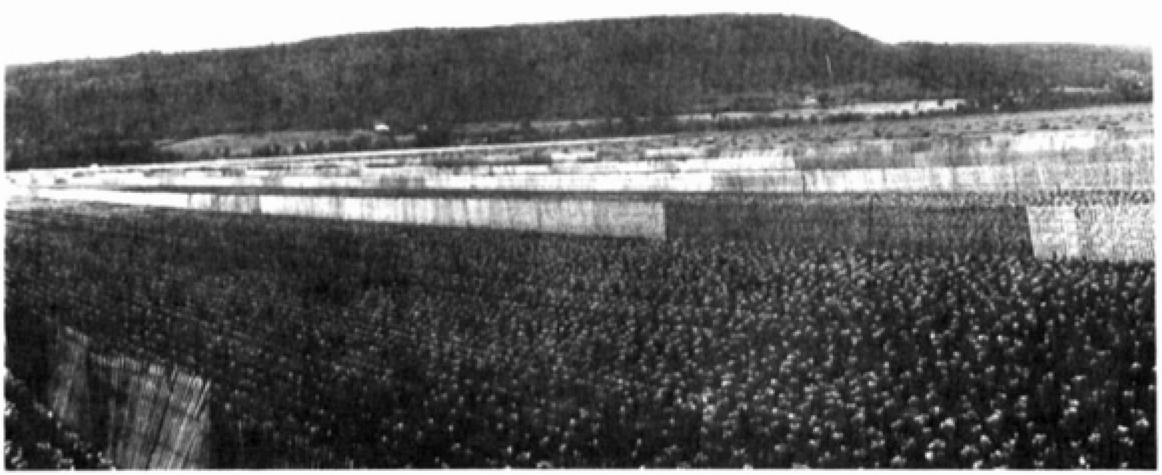


Figure 8.—Drained areas of Carlisle-Palms, nearly level, are well suited to vegetable crops. The fence windbreaks are needed to control soil blowing.

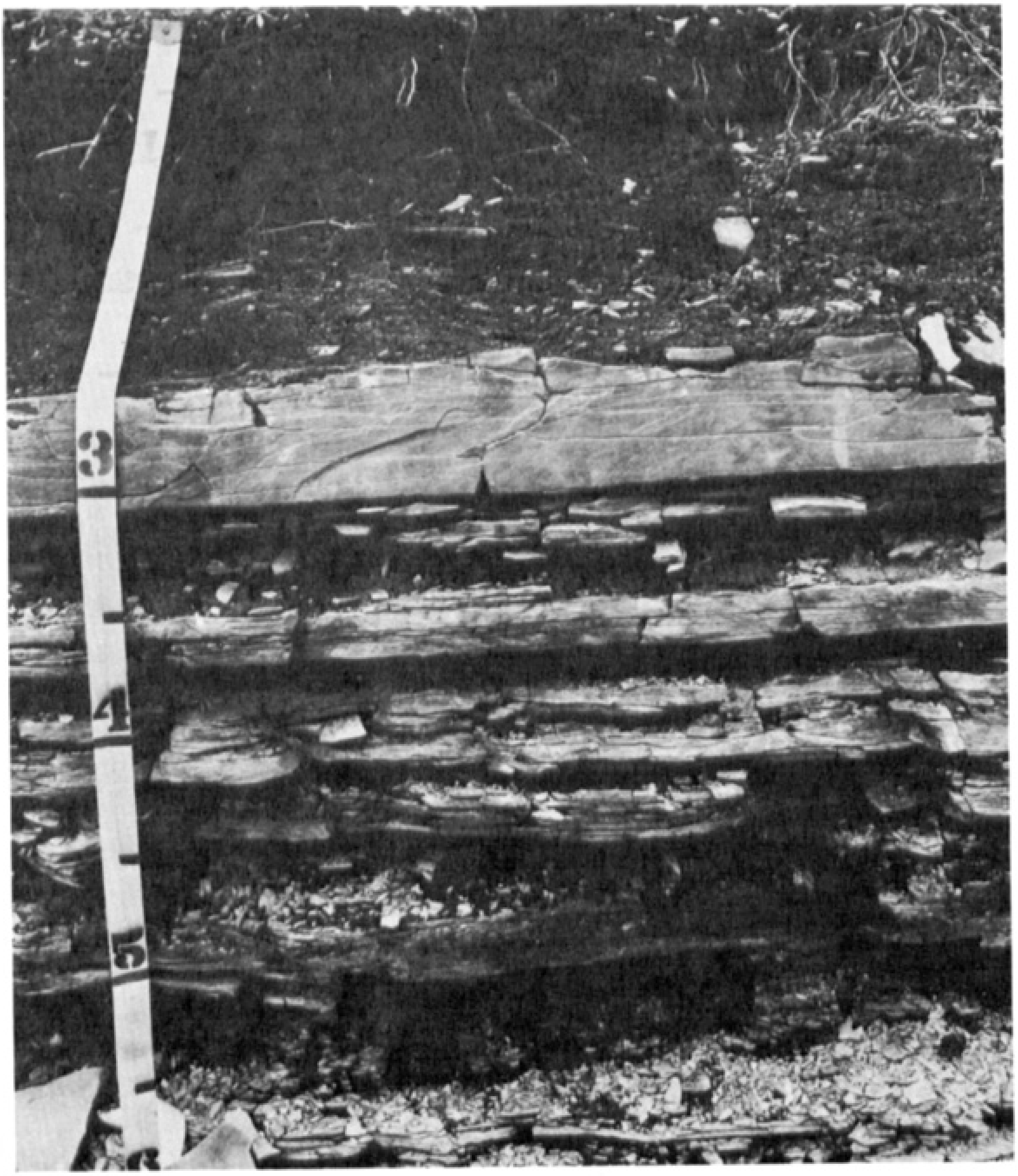


Figure 9.—Lordstown channery silt loam, 3 to 8 percent slopes, is moderately deep to interbedded sandstone and shale bedrock.

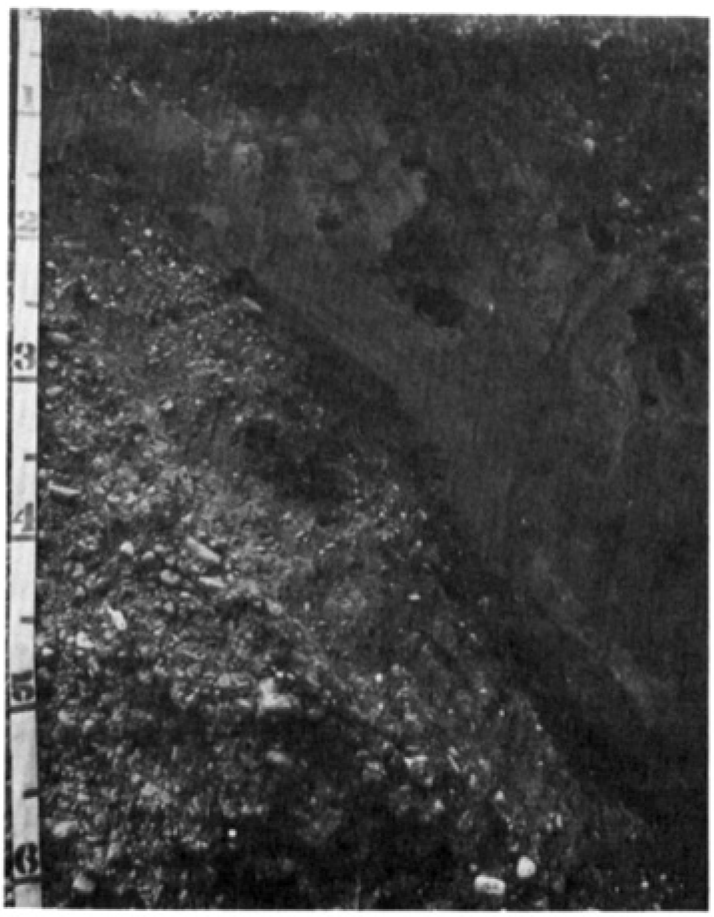


Figure 10.—Bands of gravel and sand are typical features of Palmyra-Arkport complex, rolling.



Figure 11.—In this profile of Weaver silt loam on a flood plain, a silty alluvial mantle overlies whitish, gravel-size nodules of reprecipitated calcium carbonate.



Figure 12.—Reforestation is common in the southern part of the county. These tree seedlings are planted in an area of Volusia-Chippewa association, nearly level.

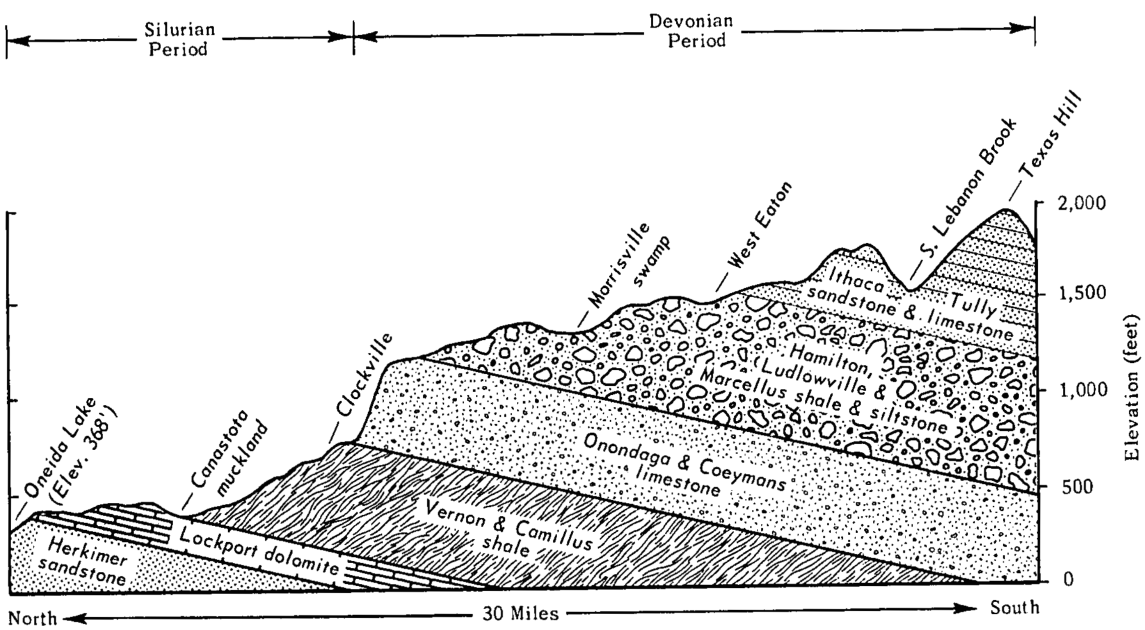


Figure 13.—This diagram shows a cross-sectional view of bedrock in Madison County.

Tables

TABLE 1.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ad	Alden mucky silt loam	2,191	0.5
AL	Alluvial land	2,258	0.5
An	Angola silt loam	680	0.2
AoA	Appleton loam, 0 to 3 percent slopes	7,043	1.7
AoB	Appleton loam, 3 to 8 percent slopes	4,553	1.1
ArB	Arkport fine sandy loam, undulating	477	0.1
ArC	Arkport fine sandy loam, rolling	409	0.1
ArD	Arkport fine sandy loam, hilly	675	0.2
AsB	Arnot channery silt loam, 3 to 8 percent slopes	2,556	0.6
AsC	Arnot channery silt loam, 8 to 15 percent slopes	463	0.1
ATF	Arnot-Lordstown complex, very steep	625	0.1
AuB	Aurora silt loam, 3 to 8 percent slopes	1,935	0.5
AuC	Aurora silt loam, 8 to 15 percent slopes	1,969	0.5
AuD	Aurora silt loam, 15 to 25 percent slopes	1,743	0.4
BaB	Bath channery silt loam, 3 to 8 percent slopes	2,042	0.5
BaC	Bath channery silt loam, 8 to 15 percent slopes	7,760	1.8
BaD	Bath channery silt loam, 15 to 25 percent slopes	8,033	1.9
BCE	Bath soils, steep	4,976	1.2
CaB	Camillus silt loam, 3 to 8 percent slopes	541	0.1
CaC	Camillus silt loam, 8 to 15 percent slopes	1,113	0.3
Cd	Canandaigua silt loam	3,999	0.9
Ce	Carlisle muck	3,118	0.7
CfB	Cazenovia silt loam, 3 to 8 percent slopes	6,861	1.6
CfC	Cazenovia silt loam, 8 to 15 percent slopes	4,543	1.1
CfC3	Cazenovia silt loam, 8 to 15 percent slopes, severely eroded	639	0.1
CfD	Cazenovia silt loam, 15 to 25 percent slopes	2,538	0.6
CgB	Chenango channery silt loam, fan, 3 to 8 percent slopes	1,981	0.5
Ch	Chippewa silt loam	3,664	0.9
CkA	Collamer silt loam, 0 to 3 percent slopes	392	0.1
CkB	Collamer silt loam, 3 to 8 percent slopes	730	0.2
CkC	Collamer silt loam, rolling	614	0.1
CkD	Collamer silt loam, hilly	305	0.1
ClA	Colonie loamy fine sand, 0 to 3 percent slopes	849	0.2
ClB	Colonie loamy fine sand, undulating	736	0.2
CoB	Conesus silt loam, 3 to 8 percent slopes	2,435	0.6
CoC	Conesus silt loam, 8 to 15 percent slopes	751	0.2
Ed	Edwards muck	1,689	0.4
ElA	Elmwood fine sandy loam, 0 to 3 percent slopes	465	0.1
ElB	Elmwood fine sandy loam, 3 to 8 percent slopes	348	0.1
En	Elnora loamy fine sand	867	0.2
FaB	Farmington cherty silt loam, 3 to 8 percent slopes	375	0.1
FGC	Farmington-Wassaic-Rock outcrop complex, sloping	2,347	0.5
FHF	Farmington-Rock outcrop complex, steep	1,041	0.2
Fo	Fonda mucky silt loam	1,369	0.3
Fr	Fredon silt loam	2,438	0.6
GaA	Galen very fine sandy loam, 0 to 3 percent slopes	853	0.2
GaB	Galen very fine sandy loam, 3 to 8 percent slopes	569	0.1
Ha	Halsey silt loam	1,145	0.3
Hb	Hamlin silt loam	1,420	0.3
HeB	Herkimer shaly silt loam, 3 to 8 percent slopes	707	0.2
HlA	Hilton loam, 0 to 3 percent slopes	932	0.2
HlB	Hilton loam, 3 to 8 percent slopes	2,148	0.5
HnB	Honeoye silt loam, 3 to 8 percent slopes	19,622	4.6
HnC	Honeoye silt loam, 8 to 15 percent slopes	13,172	3.1
HnD	Honeoye silt loam, 15 to 25 percent slopes	4,662	1.1
HnE	Honeoye silt loam, 25 to 50 percent slopes	2,013	0.5
HOE	Honeoye-Farmington complex, steep	1,956	0.5
HwA	Howard fine sandy loam, 0 to 3 percent slopes	616	0.1
HwB	Howard fine sandy loam, undulating	906	0.2
HxA	Howard gravelly silt loam, 0 to 3 percent slopes	1,754	0.4
HxB	Howard gravelly silt loam, undulating	2,640	0.6
HxC	Howard gravelly silt loam, rolling	1,825	0.4
HxD	Howard gravelly silt loam, hilly	1,277	0.3
LaB	Lairdsville silt loam, 3 to 8 percent slopes	2,776	0.7
LbC	Lairdsville silty clay loam, 8 to 15 percent slopes	1,858	0.4
LbD3	Lairdsville silty clay loam, 15 to 25 percent slopes, severely eroded	867	0.2
LbE3	Lairdsville silty clay loam, 25 to 40 percent slopes, severely eroded	1,360	0.3
Lk	Lakemont silt loam	1,544	0.4
Lm	Lamson very fine sandy loam	1,968	0.5
LsB	Lansing gravelly silt loam, 3 to 8 percent slopes	5,031	1.2
LsC	Lansing gravelly silt loam, 8 to 15 percent slopes	10,806	2.6
LsD	Lansing gravelly silt loam, 15 to 25 percent slopes	3,248	0.8

TABLE 1.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
LtA	Lima silt loam, 0 to 3 percent slopes	1,281	0.3
LtB	Lima silt loam, 3 to 8 percent slopes	7,772	1.8
LtC	Lima silt loam, 8 to 15 percent slopes	406	0.1
LuC	Lima very stony silt loam, sloping	623	0.1
LvA	Lockport silt loam, 0 to 3 percent slopes	1,505	0.4
LvB	Lockport silt loam, 3 to 8 percent slopes	249	0.1
LwB	Lordstown channery silt loam, 3 to 8 percent slopes	5,824	1.4
LwC	Lordstown channery silt loam, 8 to 15 percent slopes	11,683	2.8
LwD	Lordstown channery silt loam, 15 to 25 percent slopes	9,536	2.3
LXE	Lordstown-Arnot complex, steep	6,194	1.5
Ly	Lyons silt loam	4,493	1.1
MaB	Mardin channery silt loam, 3 to 8 percent slopes	16,010	3.8
MaC	Mardin channery silt loam, 8 to 15 percent slopes	29,816	7.0
MaD	Mardin channery silt loam, 15 to 25 percent slopes	7,941	1.9
MDC	Mardin very stony silt loam, sloping	716	0.2
Mo	Martisco muck	2,126	0.5
Mr	Middlebury silt loam	854	0.2
Mt	Minoa very fine sandy loam	2,360	0.6
Na	Naumburg loamy fine sand	778	0.2
NgA	Niagara silt loam, 0 to 3 percent slopes	4,811	1.1
NgB	Niagara silt loam, 3 to 8 percent slopes	864	0.2
Od	Odessa silt loam	4,351	1.0
OnB	Ontario Variant loam, 3 to 8 percent slopes	1,826	0.4
OnC	Ontario Variant loam, 8 to 15 percent slopes	511	0.1
OvA	Ovid silt loam, 0 to 3 percent slopes	520	0.1
OvB	Ovid silt loam, 3 to 8 percent slopes	792	0.2
Pb	Palms muck	3,599	0.9
PgA	Palmyra gravelly loam, 0 to 3 percent slopes	3,839	0.9
PgB	Palmyra gravelly loam, undulating	5,643	1.3
PgC	Palmyra gravelly loam, rolling	2,184	0.5
PgD	Palmyra gravelly loam, hilly	1,580	0.4
PhB	Palmyra gravelly silt loam, fan, 3 to 8 percent slopes	703	0.2
PKC	Palmyra-Arkport complex, rolling	627	0.1
PKD	Palmyra-Arkport complex, hilly	590	0.1
PKE	Palmyra-Arkport complex, steep	759	0.2
PME	Palmyra and Howard soils, steep	2,023	0.5
PMF	Palmyra and Howard soils, very steep	689	0.2
PpA	Phelps gravelly silt loam, 0 to 3 percent slopes	3,645	0.9
PpB	Phelps gravelly silt loam, 3 to 8 percent slopes	768	0.2
Ra	Raynham silt loam	1,786	0.4
ScB	Schoharie silt loam, 3 to 8 percent slopes	1,397	0.3
SdC	Schoharie silty clay loam, rolling	944	0.2
SdD3	Schoharie silty clay loam, hilly, severely eroded	742	0.2
SEE	Schoharie-Cazenovia complex, steep	2,067	0.5
SgB	Stockbridge channery silt loam, 3 to 8 percent slopes	3,004	0.7
SgC	Stockbridge channery silt loam, 8 to 15 percent slopes	10,278	2.4
SgD	Stockbridge channery silt loam, 15 to 25 percent slopes	6,835	1.6
ShB	Stockbridge-Howard gravelly silt loams, 3 to 8 percent slopes	1,624	0.4
ShC	Stockbridge-Howard gravelly silt loams, 8 to 15 percent slopes	2,584	0.6
ShD	Stockbridge-Howard gravelly silt loams, 15 to 25 percent slopes	1,094	0.3
Sw	Swanton fine sandy loam	964	0.2
Te	Teel silt loam	5,120	1.2
TuB	Tuller channery silt loam, 0 to 8 percent slopes	1,489	0.3
VoA	Volusia channery silt loam, 0 to 3 percent slopes	1,300	0.3
VoB	Volusia channery silt loam, 3 to 8 percent slopes	12,416	2.9
VoC	Volusia channery silt loam, 8 to 15 percent slopes	9,267	2.2
Wa	Wallkill silt loam	751	0.2
WeA	Wampsville gravelly silt loam, nearly level	351	0.1
WeB	Wampsville gravelly silt loam, undulating	1,190	0.3
WeC	Wampsville gravelly silt loam, rolling	279	0.1
WeD	Wampsville gravelly silt loam, hilly	299	0.1
Wh	Wareham loamy fine sand	1,050	0.2
Wk	Warners mucky silt loam	732	0.2
WmA	Wassaic silt loam, 0 to 3 percent slopes	491	0.1
WmB	Wassaic silt loam, 3 to 8 percent slopes	2,665	0.6
WmC	Wassaic silt loam, 8 to 15 percent slopes	1,276	0.3
Wn	Wayland silt loam	11,707	2.8
Wv	Weaver silt loam	783	0.2
Ww	Willette muck	597	0.1
	Borrow pits	160	([1])

See footnote at end of table.

TABLE 1.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
	Cut and fill land	1,003	0.2
	Gravel pits	365	0.1
	Made land	77	([1])
	Quarries	115	([1])
	Water	936	0.2
	Total	423,040	100.0

[1]Less than 0.1 percent.

TABLE 2.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Dashes indicate no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	5,610	---	---	---	---
II	118,228	69,842	39,998	8,388	---
III	169,719	114,675	50,528	4,516	---
IV	95,571	51,458	44,113	---	---
V	2,258	---	2,258	---	---
VI	15,066	11,380	---	3,686	---
VII	13,932	6,072	---	7,860	---
VIII	---	---	---	---	---

TABLE 3.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. The estimates were made in 1977. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Corn silage	Alfalfa hay	Trefoil-grass hay	Oats	Wheat	Beans, dry
	Bu	Ton	Ton	Ton	Bu	Bu	Bu
Alden:							
Ad	---	15	---	3.5	65	---	---
Alluvial land:							
AL	---	---	---	---	---	---	---
Angola:							
An	70	14	---	3.0	70	50	15
Appleton:							
AoA	90	18	3.5	3.5	70	50	30
AoB	90	18	3.5	3.5	70	50	30
Arkport:							
ArB	110	22	5.5	---	70	45	30
ArC, ArD	70	14	4.5	---	55	40	---
Arnot:							
AsB	70	14	2.0	2.5	60	---	---
AsC	60	12	2.0	2.0	50	---	---
[1]ATF	---	---	---	---	---	---	---
Aurora:							
AuB	100	20	5.0	4.5	75	50	30
AuC	85	17	4.5	4.0	65	45	25
AuD	70	14	4.0	3.5	55	40	---
Bath:							
BaB	115	23	3.5	4.0	75	45	30
BaC	95	19	3.5	4.0	75	45	25
BaD	85	17	3.0	3.5	65	40	---
[1]BCE	---	---	---	---	---	---	---
Camillus:							
CaB	120	24	6.0	---	100	70	35
CaC	110	22	5.5	---	90	60	30
Canandaigua:							
Cd	90	17	---	3.5	65	40	30
Carlisle:							
Ce	100	20	---	3.0	65	---	30
Cazenovia:							
CfB	120	24	5.5	4.5	95	65	35
CfC	110	22	5.0	4.0	90	60	30
CfC3	90	18	4.5	3.5	80	50	20
CfD	90	18	4.5	3.5	80	50	20
Chenango:							
CgB	100	20	5.0	4.5	80	45	25

See footnote at end of table.

TABLE 3.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Alfalfa hay	Trefoil-grass hay	Oats	Wheat	Beans, dry
	Bu	Ton	Ton	Ton	Bu	Bu	Bu
Chippewa: Ch	---	15	---	3.0	60	35	---
Collamer: CkA	110	22	5.0	4.5	90	60	35
CkB	110	22	5.5	4.5	90	60	35
CkC	100	20	4.5	3.5	75	50	30
CkD	80	16	4.5	3.0	50	40	---
Colonie: ClA, ClB	80	16	4.0	3.5	60	35	20
Conesus: CoB	120	24	5.0	4.5	90	60	35
CoC	110	22	4.5	4.0	85	55	30
Edwards: Ed	90	18	---	3.0	65	---	30
Elmwood: ElA	100	20	3.5	3.5	85	55	25
ElB	110	22	4.0	3.5	85	55	25
Elnora: En	90	18	3.5	3.5	85	55	25
Farmington: FaB	70	14	3.0	3.0	70	40	25
[1]FGC	---	---	2.0	2.0	---	---	---
[1]FHF	---	---	---	---	---	---	---
Fonda: Fo	---	14	---	3.0	70	---	15
Fredon: Fr	100	20	3.5	3.5	70	45	25
Galen: GaA	120	24	4.5	4.5	85	55	30
GaB	110	22	5.0	4.5	85	55	30
Halsey: Ha	90	18	---	3.5	65	35	20
Hamlin: Hb	135	27	6.5	---	100	55	35
Herkimer: HeB	130	26	6.0	---	95	60	35
Hilton: HlA	120	24	5.0	---	90	60	30
HlB	120	24	5.0	---	90	60	35
Honeoye: HnB	130	26	6.0	---	110	65	35
HnC	120	24	5.5	---	100	65	30
HnD	95	19	5.0	---	85	55	20

See footnote at end of table.

TABLE 3.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Alfalfa hay	Trefoil-grass hay	Oats	Wheat	Beans, dry
	Bu	Ton	Ton	Ton	Bu	Bu	Bu
Honeoye:							
HnE	---	---	---	3.0	---	---	---
[1]HOE	---	---	---	---	---	---	---
Howard:							
HwA, HwB	110	22	5.0	4.0	85	50	25
HxA, HxB	100	20	5.0	4.0	80	45	25
HxC	90	18	4.5	4.0	75	40	20
HxD	70	14	4.0	3.5	50	35	---
Lairdsville:							
LaB	90	18	4.0	3.5	70	50	25
LbC	80	16	3.5	3.5	65	45	20
LbD3	---	---	2.5	---	---	---	---
LbE3	---	---	---	---	---	---	---
Lakemont:							
Lk	70	14	---	3.0	55	---	15
Lamson:							
Lm	90	18	---	3.0	50	---	20
Lansing:							
LsB	120	24	5.5	---	95	60	35
LsC	110	22	5.5	---	95	60	30
LsD	90	18	5.0	---	80	50	20
Lima:							
LtA	110	22	5.0	---	90	55	30
LtB	120	24	5.0	---	90	55	35
LtC	110	22	4.5	---	85	50	25
LuC	---	---	---	---	---	---	---
Lockport:							
LvA	75	15	---	3.5	70	45	20
LvB	80	16	---	3.5	70	50	20
Lordstown:							
LwB	85	17	3.5	4.0	75	45	20
LwC	85	17	3.5	4.0	70	40	20
LwD	70	14	3.0	3.5	65	35	---
[1]LXE	---	---	---	---	---	---	---
Lyons:							
Ly	---	16	---	3.5	55	---	20
Mardin:							
MaB	90	18	4.0	4.0	70	40	20
MaC	85	17	4.0	4.0	65	40	20
MaD	70	14	3.5	3.5	65	35	---
MDC	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 3.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Alfalfa hay	Trefoil-grass hay	Oats	Wheat	Beans, dry
	Bu	Ton	Ton	Ton	Bu	Bu	Bu
Martisco:							
Mo	90	18	---	3.0	65	---	20
Middlebury:							
Mr	115	23	4.5	4.0	75	45	25
Minoa:							
Mt	85	17	3.5	3.0	80	45	25
Naumburg:							
Na	80	16	3.0	3.0	60	40	20
Niagara:							
NgA	90	18	3.5	3.5	70	45	25
NgB	90	18	3.5	3.5	70	45	25
Odessa:							
Od	85	17	3.0	3.5	65	45	20
Ontario Variant:							
OnB	130	26	6.0	---	110	65	25
OnC	120	24	5.5	---	100	65	25
Ovid:							
OvA	85	17	3.5	3.5	65	45	---
OvB	85	17	3.5	3.5	65	45	---
Palms:							
Pb	90	18	---	3.0	65	---	30
Palmyra:							
PgA	115	23	5.5	---	85	55	30
PgB	110	22	5.5	---	85	50	25
PgC	90	18	4.5	---	75	45	20
PgD	70	14	4.0	3.5	50	35	---
PhB	110	22	5.5	---	85	50	30
[1]PKC	85	17	---	---	66	40	20
[1]PKD	70	14	4.0	3.5	50	35	---
[1]PKE	---	---	---	3.0	---	---	---
[1]PME	---	---	---	3.0	---	---	---
[1]PMF	---	---	---	---	---	---	---
Phelps:							
PpA	110	22	5.0	---	90	50	30
PpB	110	22	5.0	---	90	55	25
Raynham:							
Ra	90	18	3.5	3.5	70	45	25
Schoharie:							
ScB	120	24	5.0	4.0	95	60	30
SdC	110	22	4.5	4.0	90	55	25
SdD3	---	---	---	3.5	---	---	---
[1]SEE	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 3.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Alfalfa hay	Trefoil-grass hay	Oats	Wheat	Beans, dry
	Bu	Ton	Ton	Ton	Bu	Bu	Bu
Stockbridge:							
SgB	110	22	5.0	4.5	80	50	30
SgC	100	20	5.0	4.5	75	45	25
SgD	80	16	4.5	4.0	60	35	---
[1]ShB	115	23	5.0	4.5	85	50	30
[1]ShC	100	20	5.0	4.5	75	45	25
[1]ShD	80	16	4.5	4.0	60	35	---
Swanton:							
Sw	85	17	3.0	3.5	70	45	25
Teel:							
Te	125	25	5.0	---	85	45	30
Tuller:							
TuB	70	14	---	2.5	60	30	---
Volusia:							
VoA	80	16	---	3.5	65	35	---
VoB	80	16	---	3.5	65	35	---
VoC	70	14	---	3.5	60	30	---
Wallkill:							
Wa	110	22	4.5	4.0	80	45	30
Wampsville:							
WeA	120	24	6.0	---	90	65	35
WeB	115	23	5.5	---	85	65	30
WeC	100	20	5.0	---	80	60	25
WeD	75	15	4.5	---	70	55	---
Wareham:							
Wh	---	15	---	3.0	60	40	---
Warners:							
Wk	75	19	4.0	4.0	80	35	---
Wassaic:							
WmA	105	21	5.5	4.5	85	55	35
WmB	105	21	5.0	4.0	85	50	30
WmC	95	19	4.5	3.5	75	40	20
Wayland:							
Wn	95	19	3.5	3.5	70	40	25
Weaver:							
Wv	110	22	5.0	---	80	40	25
Willette:							
Ww	85	17	---	3.0	60	---	25

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Alden: Ad	5w	Slight	Severe	Severe	Severe	Red maple	50	
Angola: An	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple	70 60	Eastern white pine, Norway spruce, white spruce, European larch.
Appleton: AoA, AoB	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple	70 60	European larch, Norway spruce, white spruce.
Arkport: ArB, ArC	2o	Slight	Slight	Slight	Slight	Sugar maple Red pine Eastern white pine	70 85 85	Norway spruce, red pine, eastern white pine.
ArD	2o	Moderate	Moderate	Slight	Slight	Eastern white pine	85	Eastern white pine.
Arnot: AsB, AsC	5d	Slight	Slight	Severe	Moderate	Northern red oak Sugar maple Eastern white pine White ash European larch	55 55 65 55 55	Eastern white pine, red pine, sugar maple, European larch.
[1]ATF: Arnot part	5d	Moderate	Severe	Severe	Moderate	Northern red oak Sugar maple Eastern white pine White ash European larch	55 52 60 52 60	Eastern white pine, red pine, sugar maple, European larch.
Lordstown part	3r	Moderate	Severe	Moderate	Slight	Northern red oak Sugar maple White ash	65 60 60	Eastern white pine, European larch, black cherry, red pine, Norway spruce.
Aurora: AuB, AuC	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple	70 65	Norway spruce, white spruce, European larch.
AuD	3r	Moderate	Moderate	Slight	Slight	Northern red oak Sugar maple	70 65	Norway spruce, white spruce, European larch.
Bath: BaB, BaC	3o	Slight	Slight	Slight	Slight	Northern red oak Black cherry Sugar maple	65 75 70	Eastern white pine, red pine, Norway spruce, European larch.
BaD	3r	Slight	Moderate	Slight	Slight	Northern red oak Black cherry Sugar maple	65 75 70	Eastern white pine, red pine, Norway spruce, European larch.
[1]BCE	3r	Moderate	Severe	Slight	Slight	Northern red oak Black cherry Sugar maple	65 75 70	Eastern white pine, red pine, Norway spruce, European larch.

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Camillus:								
CaB	2o	Slight	Slight	Slight	Slight	Sugar maple Eastern white pine Northern red oak	70 85 80	Eastern white pine, red pine, Norway spruce, European larch.
CaC	2r	Moderate	Slight	Slight	Slight	Sugar maple Eastern white pine Northern red oak	70 85 80	Eastern white pine, red pine, Norway spruce, European larch.
Canandaigua:								
Cd	4w	Slight	Severe	Severe	Severe	Red maple Eastern white pine	65 65	Eastern white pine, white spruce.
Carlisle:								
Ce	4w	Slight	Severe	Severe	Severe	Red maple Northern white cedar	45 50	Generally unplantable.
Cazenovia:								
CfB, CfC, CfC3	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Yellow-poplar	70 80 85	Norway spruce, white spruce, eastern white pine, yellow-poplar, European larch.
CfD	2r	Moderate	Moderate	Slight	Slight	Sugar maple Northern red oak Yellow-poplar	70 80 85	Norway spruce, white spruce, eastern white pine, yellow-poplar, European larch.
Chenango:								
CgB	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak	65 70	Eastern white pine, Norway spruce, red pine, European larch.
Chippewa:								
Ch	5w	Slight	Severe	Severe	Severe	Red maple	50	Eastern white pine, white spruce.
Collamer:								
CkA, CkB	2o	Slight	Slight	Slight	Slight	Sugar maple Black cherry White ash Northern red oak American basswood	70 80 70 80 70	Eastern white pine, Norway spruce, white spruce, European larch, Scotch pine, balsam fir, Douglas-fir.
CkC	2r	Moderate	Slight	Slight	Slight	Sugar maple Black cherry White ash Northern red oak American basswood	70 80 70 80 70	Eastern white pine, Norway spruce, white spruce, European larch, Scotch pine, balsam fir, Douglas-fir.
CkD	2r	Moderate	Moderate	Slight	Slight	Sugar maple Black cherry White ash Northern red oak American basswood	70 80 70 80 70	Eastern white pine, Norway spruce, white spruce, European larch, Scotch pine, balsam fir, Douglas-fir.
Colonie:								
ClA, ClB	4s	Slight	Slight	Severe	Slight	Eastern white pine Northern red oak Sugar maple White oak Black oak	65 60 55 60 60	Eastern white pine, European larch.

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Conesus:								
CoB, CoC	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak	70 80	Eastern white pine, European larch, Norway spruce, white spruce.
Edwards:								
Ed	4w	Slight	Severe	Severe	Severe	Red maple	46	Generally unplantable.
Elmwood:								
ElA, ElB	3o	Slight	Slight	Slight	Slight	Eastern white pine	75	Eastern white pine, red pine, white spruce, European larch.
Elnora:								
En	4s	Slight	Slight	Severe	Slight	Northern red oak Eastern white pine Sugar maple	60 65 55	Eastern white pine, Norway spruce, white ash, black cherry.
Farmington:								
FaB	5d	Slight	Slight	Severe	Moderate	Sugar maple Northern red oak Eastern white pine	50 50 55	Eastern white pine, red pine, European larch.
[1]FGC:								
Farmington part	5d	Slight	Slight	Severe	Moderate	Sugar maple Northern red oak Eastern white pine	50 50 55	Eastern white pine, red pine, European larch.
Wassaic part	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak White ash	65 70 65	Eastern white pine, red pine, European larch, Norway spruce.
Rock outcrop part.								
[1]FHF:								
Farmington part	5d	Severe	Severe	Severe	Moderate	Sugar maple Northern red oak Eastern white pine	50 50 55	Eastern white pine, red pine, European larch.
Rock outcrop part.								
Fonda:								
Fo	5w	Slight	Severe	Severe	Severe	Red maple Eastern white pine	50 55	Northern white-cedar.
Fredon:								
Fr	3w	Slight	Severe	Severe	Severe	Northern red oak Eastern white pine Red maple	70 70 75	Yellow-poplar, eastern white pine, white spruce, Norway spruce.
Galen:								
GaA, GaB	2o	Slight	Slight	Slight	Slight	Sugar maple White ash Eastern white pine	70 84 85	Eastern white pine, red pine, Norway spruce, European larch.
Halsey:								
Ha	5w	Slight	Severe	Severe	Severe	Red maple	55	Eastern white pine, white spruce.
Hamlin:								
Hb	2o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple	80 70	Eastern white pine, black locust, Norway spruce, black walnut, European larch.

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Herkimer:								
HeB	2o	Slight	Slight	Slight	Slight	Sugar maple White ash Eastern white pine	69 80 85	Eastern white pine, red pine, Norway spruce, European larch.
Hilton:								
HlA, HlB	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak	70 80	Eastern white pine, European larch, Norway spruce.
Honeoye:								
HnB, HnC	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Yellow-poplar	70 80 85	Eastern white pine, black walnut, yellow-poplar, black cherry.
HnD	2r	Moderate	Moderate	Slight	Slight	Sugar maple Northern red oak Yellow-poplar	70 80 85	Eastern white pine, black walnut, yellow-poplar, black cherry.
[1]HOE:								
Honeoye part	2r	Severe	Severe	Slight	Slight	Sugar maple Northern red oak	70 80	Eastern white pine, European larch.
Farmington part	5d	Severe	Severe	Severe	Moderate	Sugar maple Northern red oak Eastern white pine	50 50 55	Eastern white pine, red pine, European larch.
Howard:								
HwA, HwB, HxA, HxB, HxC	2o	Slight	Slight	Slight	Slight	Sugar maple	70	Eastern white pine, European larch, sugar maple, Douglas-fir, balsam fir, black locust.
HxD	2r	Moderate	Moderate	Slight	Slight	Sugar maple	70	Eastern white pine, European larch, sugar maple, Douglas-fir, balsam fir, black locust.
Lairdsville:								
LaB, LbC	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry	60 70 70	Eastern white pine, Norway spruce.
LbD3, LbE3	3r	Severe	Moderate	Moderate	Slight	Sugar maple Northern red oak Eastern white pine	60 70 75	Eastern white pine, Norway spruce, white spruce.
Lakemont:								
Lk	5w	Slight	Severe	Severe	Severe	White ash Red maple	50 65	Eastern white pine, northern white-cedar, white spruce.
Lamson:								
Lm	4w	Slight	Severe	Severe	Severe	Eastern white pine Red maple	65 50	Northern white-cedar.
Lansing:								
LsB, LsC	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Yellow-poplar	70 80 85	Eastern white pine, black cherry, yellow-poplar.

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Lansing:								
LsD	2r	Moderate	Moderate	Slight	Slight	Sugar maple Northern red oak Yellow-poplar	70 80 85	Eastern white pine, black cherry, yellow-poplar.
Lima:								
LtA, LtB, LtC, LuC	2o	Slight	Slight	Slight	Slight	Yellow-poplar Sugar maple Northern red oak	85 70 80	Eastern white pine, yellow-poplar, black walnut, black cherry.
Lockport:								
LvA, LvB	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple	70 60	Eastern white pine, white spruce, Norway spruce.
Lordstown:								
LwB, LwC	3f	Slight	Slight	Moderate	Slight	Northern red oak Sugar maple White ash	70 65 65	Eastern white pine, European larch, black cherry, red pine, Norway spruce.
LwD	3r	Slight	Moderate	Moderate	Slight	Northern red oak Sugar maple White ash	70 65 65	Eastern white pine, European larch, black cherry, red pine, Norway spruce.
[1]LXE:								
Lordstown part	3r	Moderate	Severe	Moderate	Slight	Northern red oak Sugar maple White ash	70 65 65	Eastern white pine, European larch, black cherry, red pine, Norway spruce.
Arnot part	5d	Moderate	Severe	Severe	Moderate	Northern red oak Sugar maple Eastern white pine White ash European larch	55 50 65 55 65	Eastern white pine, red pine, sugar maple, European larch.
Lyons:								
Ly	5w	Slight	Severe	Severe	Severe	Red maple	55	Northern white-cedar.
Mardin:								
MaB, MaC, MDC	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry	60 63 75	Red pine, European larch, Norway spruce, eastern white pine.
MaD	3r	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak Black cherry	60 63 75	Red pine, European larch, Norway spruce, eastern white pine.
Martisco:								
Mo	5w	Slight	Severe	Severe	Severe	Red maple	55	Generally unplantable.
Middlebury:								
Mr	2o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple Yellow-poplar	80 70 85	Eastern white pine, yellow-poplar, Norway spruce, European larch, black walnut, black cherry.

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Important trees	Site index	
Minoa:								
Mt	3w	Slight	Moderate	Moderate	Moderate	Sugar maple	60	Eastern white pine, Norway spruce, European larch, white spruce.
						White ash	69	
						Northern red oak	70	
Naumburg:								
Na	4w	Slight	Moderate	Severe	Moderate	Sugar maple	55	Eastern white pine, Norway spruce, white spruce.
						Eastern white pine	65	
Niagara:								
NgA, NgB	3w	Slight	Moderate	Moderate	Moderate	Sugar maple	65	Eastern white pine, white spruce, Norway spruce.
						Northern red oak	70	
						White ash	70	
						Black cherry	70	
Odessa:								
Od	3w	Slight	Moderate	Slight	Slight	Sugar maple	65	Eastern white pine, white spruce, Norway spruce.
						Northern red oak	65	
						Eastern white pine	70	
Ontario Variant:								
OnB, OnC	2o	Slight	Slight	Slight	Slight	Sugar maple	70	Eastern white pine, black walnut, yellow-poplar.
						Northern red oak	80	
						Yellow-poplar	85	
Ovid:								
OvA, OvB	3w	Slight	Moderate	Moderate	Moderate	Northern red oak	70	Eastern white pine, white spruce, Norway spruce.
						Sugar maple	60	
						Eastern white pine	70	
Palms:								
Pb	4w	Slight	Severe	Severe	Severe	Red maple	46	Generally unplantable.
						Silver maple	50	
						White ash	50	
						Quaking aspen	40	
Palmyra:								
PgA, PgB, PgC	2o	Slight	Slight	Slight	Slight	Sugar maple	70	Eastern white pine, European larch, black locust.
						Northern red oak	80	
PgD	2r	Moderate	Moderate	Slight	Slight	Sugar maple	70	Eastern white pine, European larch, black locust.
						Northern red oak	80	
PhB	2o	Slight	Slight	Slight	Slight	Sugar maple	70	Eastern white pine, European larch, black locust.
[1]PKC:								
Palmyra part	2o	Slight	Slight	Slight	Slight	Sugar maple	70	Eastern white pine, European larch, black locust.
						Northern red oak	80	
Arkport part	2o	Slight	Slight	Slight	Slight	Sugar maple	70	Norway spruce, red pine, eastern white pine.
						Red pine	85	
						Eastern white pine	85	
[1]PKD:								
Palmyra part	2r	Moderate	Moderate	Slight	Slight	Sugar maple	70	Eastern white pine, European larch, black locust.
						Northern red oak	80	
Arkport part	2r	Moderate	Moderate	Slight	Slight	Sugar maple	70	Norway spruce, eastern white pine.
						Eastern white pine	85	
						Red pine	85	

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Palmyra:								
[1]PKE:								
Palmyra part	2r	Moderate	Severe	Slight	Slight	Sugar maple Northern red oak	70 80	Eastern white pine, European larch, black locust.
Arkport part	2r	Moderate	Severe	Slight	Slight	Sugar maple Eastern white pine Red pine	70 85 85	Norway spruce, eastern white pine.
[1]PME:								
Palmyra part	2r	Moderate	Severe	Slight	Slight	Sugar maple Northern red oak	70 80	Eastern white pine, European larch, black locust.
Howard part	2r	Moderate	Moderate	Slight	Slight	Sugar maple	70	Eastern white pine, European larch, sugar maple, Douglas-fir, balsam fir, black locust.
[1]PMF:								
Palmyra part	2r	Moderate	Severe	Slight	Slight	Sugar maple Northern red oak	70 80	Eastern white pine, European larch, black locust.
Howard part	2r	Moderate	Moderate	Slight	Slight	Sugar maple	70	Eastern white pine, European larch, sugar maple, Douglas-fir, balsam fir, black locust.
Phelps:								
PpA, PpB	2o	Slight	Slight	Slight	Slight	Sugar maple White ash Eastern white pine	70 84 85	Eastern white pine, red pine, Norway spruce, European larch.
Raynham:								
Ra	4w	Slight	Severe	Severe	Severe	Eastern white pine White spruce Red spruce	65 55 45	Eastern white pine, white spruce, northern white-cedar.
Schoharie:								
ScB	2o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple	80 70	Eastern white pine, yellow-poplar, black cherry, black walnut.
SdC	2r	Moderate	Slight	Slight	Slight	Northern red oak Sugar maple	80 70	Eastern white pine, yellow-poplar, black cherry, black walnut.
SdD3	2r	Severe	Moderate	Slight	Slight	Northern red oak Sugar maple	80 70	Eastern white pine, yellow-poplar, black cherry, black walnut.
[1]SEE:								
Schoharie part	2r	Severe	Severe	Slight	Slight	Northern red oak Sugar maple	80 70	Eastern white pine, yellow-poplar, black cherry, black walnut.
Cazenovia part	2r	Severe	Severe	Slight	Slight	Sugar maple Northern red oak Yellow-poplar	80 70 85	Norway spruce, eastern white pine, European larch.

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Important trees	Site index	Trees to plant
Stockbridge:								
SgB, SgC	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple Eastern white pine	70 60 75	Eastern white pine, white spruce, Norway spruce, European larch.
SgD	3r	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple Eastern white pine	70 60 75	Eastern white pine, white spruce, Norway spruce, European larch.
[1]ShB:								
Stockbridge part	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple Eastern white pine	70 60 75	Eastern white pine, white spruce, Norway spruce, European larch.
Howard part	2o	Slight	Slight	Slight	Slight	Sugar maple	70	Eastern white pine, European larch, sugar maple, Douglas-fir, balsam fir, black locust.
[1]ShC:								
Stockbridge part	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple Eastern white pine	70 60 75	Eastern white pine, white spruce, Norway spruce, European larch.
Howard part	2o	Slight	Slight	Slight	Slight	Sugar maple	70	Eastern white pine, European larch, sugar maple, Douglas-fir, balsam fir, black locust.
[1]ShD:								
Stockbridge part	3r	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple Eastern white pine	70 60 75	Eastern white pine, white spruce, Norway spruce, European larch.
Howard part	2r	Moderate	Moderate	Slight	Slight	Sugar maple	70	Eastern white pine, European larch, sugar maple, Douglas-fir, balsam fir, black locust.
Swanton:								
Sw	5w	Slight	Severe	Severe	Severe	Eastern white pine Sugar maple Red spruce Red maple	57 55 35 55	Eastern white pine, white spruce, northern white-cedar.
Teel:								
Te	2o	Slight	Slight	Slight	Slight	Sugar maple	70	Eastern white pine, Norway spruce, black walnut, European larch.
Tuller:								
TuB	5w	Slight	Severe	Severe	Severe	Red maple Eastern hemlock Sugar maple Northern white-cedar Yellow birch	55 55 50 45 50	Eastern white pine, white spruce, Norway spruce.

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Volusia: VoA, VoB, VoC	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple White ash	62 64 75	Eastern white pine, Norway spruce, European larch, white spruce, black cherry.
Wallkill: Wa	4w	Slight	Severe	Severe	Severe	Pin oak Red maple	80 65	
Wampsville: WeA, WeB, WeC	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak	70 80	Eastern white pine, black walnut, European larch.
WeD	2r	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak	70 80	Eastern white pine, black walnut, European larch.
Wareham: Wh	4w	Slight	Severe	Severe	Severe	Eastern white pine Red maple Sugar maple Red pine Northern red oak	65 65 55 70 60	Eastern white pine, red pine, white spruce.
Warners: Wk	5w	Slight	Severe	Severe	Severe	Red maple	55	
Wassaic: WmA, WmB, WmC	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak White ash	65 70 75	Eastern white pine, red pine, European larch, Norway spruce.
Wayland: Wn	4w	Slight	Severe	Severe	Severe	Red maple	65	
Weaver: Wv	2w	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak	70 80	Yellow-poplar, black walnut.
Willette: Ww	4w	Slight	Severe	Severe	Severe	Red maple	46	Generally unplantable.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 5.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Alden:										
Ad	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Alluvial land:										
AL	Very poor	Very poor	Poor	Poor	Poor	Fair	Fair	Very poor	Poor	Fair
Angola:										
An	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
Appleton:										
AoA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
AoB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Arkport:										
ArB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
ArC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
ArD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Arnot:										
AsB	Poor	Poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
AsC	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
[1]ATF:										
Arnot part	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Lordstown part	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Aurora:										
AuB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
AuC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
AuD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Bath:										
BaB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
BaC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
BaD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
[1]BCE	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Camillus:										
CaB	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Camillus: CaC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Canandaigua: Cd	Very poor	Poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good
Carlisle: Ce	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Cazenovia: CfB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CfC, CfC3	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
CfD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Chenango: CgB	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
Chippewa: Ch	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
Collamer: CkA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
CkB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CkC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
CkD	Poor	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Colonie: ClA, ClB	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Conesus: CoB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CoC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Edwards: Ed	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Elmwood: ElA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
ElB	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Elnora: En	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor
Farmington: FaB	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Farmington:										
[1]FGC:										
Farmington part	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Wassaic part	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
Rock outcrop part.										
[1]FHF:										
Farmington part	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Rock outcrop part.										
Fonda:										
Fo	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Fredon:										
Fr	Poor	Fair	Fair	Fair	Fair	Poor	Good	Fair	Fair	Good
Galen:										
GaA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
GaB	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Halsey:										
Ha	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Hamlin:										
Hb	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Herkimer:										
HeB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Hilton:										
HlA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
HlB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Honeoye:										
HnB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
HnC	Fair	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
HnD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
HnE	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
[1]HOE:										
Honeoye part	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Farmington part	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Howard:										
HwA, HwB, HxA, HxB	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Good	Very poor
HxC	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Good	Very poor
HxD	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Good	Very poor
Lairdsville:										
LaB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
LbC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
LbD3	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
LbE3	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Lakemont:										
Lk	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Lamson:										
Lm	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Lansing:										
LsB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
LsC	Fair	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
LsD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Lima:										
LtA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
LtB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
LtC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
LuC	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Lockport:										
LvA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
LvB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Lordstown:										
LwB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
LwC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
LwD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Lordstown:										
[1]LXE:										
Lordstown part	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Arnot part	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Lyons:										
Ly	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Mardin:										
MaB	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
MaC	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
MaD	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
MDC	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Martisco:										
Mo	Poor	Poor	Very poor	Very poor	Very poor	Good	Good	Very poor	Very poor	Good
Middlebury:										
Mr	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Minoa:										
Mt	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
Naumburg:										
Na	Poor	Fair	Fair	Fair	Fair	Poor	Very poor	Fair	Fair	Very poor
Niagara:										
NgA	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair
NgB	Fair	Good	Good	Good	Good	Good	Very poor	Good	Good	Poor
Odessa:										
Od	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
Ontario Variant:										
OnB, OnC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Ovid:										
OvA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
OvB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Palms:										
Pb	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Palmyra:										
PgA, PgB	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Good	Very poor
PgC	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Good	Very poor

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Palmyra:										
PgD	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Good	Very poor
PhB	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
[1]PKC:										
Palmyra part	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Good	Very poor
Arkport part	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
[1]PKD:										
Palmyra part	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Good	Very poor
Arkport part	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
[1]PKE:										
Palmyra part	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Good	Very poor
Arkport part	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
[1]PME:										
Palmyra part	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Good	Very poor
Howard part	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Good	Very poor
[1]PMF:										
Palmyra part	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Good	Very poor
Howard part	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Good	Very poor
Phelps:										
PpA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
PpB	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Raynham:										
Ra	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
Schoharie:										
ScB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
SdC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
SdD3	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
[1]SEE:										
Schoharie part	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Cazenovia part	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Stockbridge:										
SgB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
SgC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
SgD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
[1]ShB:										
Stockbridge part	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Howard part	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Good	Very poor
[1]ShC:										
Stockbridge part	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Howard part	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Good	Very poor
[1]ShD:										
Stockbridge part	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Howard part	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Good	Very poor
Swanton:										
Sw	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
Teel:										
Te	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Tuller:										
TuB	Very poor	Poor	Poor	Very poor	Very poor	Poor	Very poor	Poor	Very poor	Very poor
Volusia:										
VoA	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Fair	Poor	Fair
VoB	Fair	Fair	Fair	Poor	Poor	Poor	Very poor	Fair	Poor	Very poor
VoC	Poor	Fair	Fair	Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor
Wallkill:										
Wa	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Wampsville:										
WeA	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
WeB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
WeC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
WeD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Wareham:										
Wh	Poor	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good
Warners:										
Wk	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Wassaic:										
WmA, WmB	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
WmC	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
Wayland:										
Wn	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Weaver:										
Wv	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Willette:										
Ww	Good	Poor	Poor	Poor	Poor	Good	Good	Fair	Poor	Good

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 6.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Alden:				
Ad	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Alluvial land:				
AL	Severe: floods, wetness.	Severe: wetness, floods.	Severe: floods, wetness.	Severe: wetness, floods.
Angola:				
An	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Appleton:				
AoA, AoB	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Arkport:				
ArB	Slight	Slight	Moderate: slope.	Slight.
ArC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
ArD	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Arnot:				
AsB	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock, small stones.	Moderate: small stones.
AsC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, depth to rock, small stones.	Moderate: small stones.
[1]ATF:				
Arnot part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Severe: slope.
Lordstown part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Aurora:				
AuB	Moderate: percs slowly.	Slight	Moderate: depth to rock, slope.	Slight.
AuC	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight.
AuD	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Bath:				
BaB	Moderate: percs slowly, small stones.	Moderate: small stones.	Moderate: percs slowly, slope, small stones.	Moderate: small stones.
BaC	Moderate: percs slowly, slope, small stones.	Moderate: slope, small stones.	Severe: slope.	Moderate: small stones.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Bath:				
BaD	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, small stones.
[1]BCE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Camillus:				
CaB	Slight	Slight	Moderate: slope, small stones.	Slight.
CaC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Canandaigua:				
Cd	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Carlisle:				
Ce	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.
Cazenovia:				
CfB	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope, small stones.	Slight.
CfC, CfC3	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight.
CfD	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Chenango:				
CgB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
Chippewa:				
Ch	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Collamer:				
CkA	Slight	Slight	Moderate: percs slowly.	Slight.
CkB	Slight	Slight	Moderate: slope, percs slowly.	Slight.
CkC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
CkD	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Colonie:				
ClA	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: too sandy.
ClB	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: slope, too sandy, soil blowing.	Moderate: too sandy.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Conesus:				
CoB	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
CoC	Moderate: percs slowly, slope.	Moderate: slope	Severe: slope.	Slight.
Edwards:				
Ed	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.
Elmwood:				
ElA	Moderate: percs slowly.	Slight	Moderate: wetness.	Slight.
ElB	Moderate: percs slowly.	Slight	Moderate: slope, wetness.	Slight.
Elnora:				
En	Moderate: too sandy.	Moderate: too sandy.	Moderate: wetness, too sandy.	Moderate: too sandy.
Farmington:				
FaB	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock.	Moderate: small stones.
[1]FGC:				
Farmington part	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, depth to rock.	Moderate: small stones.
Wassaic part	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Rock outcrop part.				
[1]FHF:				
Farmington part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop part.				
Fonda:				
Fo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Fredon:				
Fr	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Galen:				
GaA	Slight	Slight	Moderate: wetness.	Slight.
GaB	Slight	Slight	Moderate: slope, wetness.	Slight.
Halsey:				
Ha	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Hamlin:				
Hb	Moderate: floods.	Moderate: floods.	Moderate: floods.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Herkimer:				
HeB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
Hilton:				
HlA, HlB	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
Honeoye:				
HnB	Slight	Slight	Moderate: slope.	Slight.
HnC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
HnD	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
HnE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]HOE:				
Honeoye part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Farmington part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
Howard:				
HwA	Slight	Slight	Slight	Slight.
HwB	Slight	Slight	Moderate: slope.	Slight.
HxA, HxB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
HxC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
HxD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
Lairdsville:				
LaB	Moderate: percs slowly.	Slight	Severe: percs slowly.	Slight.
LbC	Moderate: percs slowly, slope, too clayey.	Moderate: slope, too clayey.	Severe: slope, percs slowly.	Moderate: too clayey.
LbD3	Severe: slope.	Severe: slope.	Severe: slope, percs slowly.	Moderate: slope, too clayey.
LbE3	Severe: slope.	Severe: slope.	Severe: slope, percs slowly.	
Lakemont:				
Lk	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
Lamson:				
Lm	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Lansing:				
LsB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Lansing:				
LsC	Moderate: slope, small stones.	Moderate: small stones.	Severe: slope.	Moderate: small stones.
LsD	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: small stones, slope.
Lima:				
LtA, LtB	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
LtC	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight.
LuC	Moderate: percs slowly, slope, large stones.	Moderate: slope.	Severe: slope.	Moderate: large stones.
Lockport:				
LvA, LvB	Severe: percs slowly, wetness.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.
Lordstown:				
LwB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
LwC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
LwD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
[1]LXE:				
Lordstown part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Arnot part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Severe: slope.
Lyons:				
Ly	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Mardin:				
MaB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
MaC	Moderate: slope, percs slowly, small stones.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: small stones.
MaD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones, slope.
MDC	Moderate: slope, percs slowly, large stones.	Moderate: slope.	Severe: slope.	Moderate: large stones.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Martisco:				
Mo	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.
Middlebury:				
Mr	Moderate: floods.	Moderate: floods.	Moderate: floods.	Slight.
Minoa:				
Mt	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Slight.
Naumburg:				
Na	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Niagara:				
NgA, NgB	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Odessa:				
Od	Moderate: percs slowly, wetness.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.
Ontario Variant:				
OnB	Slight	Slight	Moderate: slope.	Slight.
OnC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Ovid:				
OvA, OvB	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
Palms:				
Pb	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.
Palmyra:				
PgA, PgB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
PgC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
PgD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
PhB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
[1]PKC:				
Palmyra part	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
Arkport part	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
[1]PKD:				
Palmyra part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Palmyra:				
Arkport part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
[1]PKE:				
Palmyra part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Arkport part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]PME:				
Palmyra part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Howard part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
[1]PMF:				
Palmyra part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Howard part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Phelps:				
PpA, PpB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
Raynham:				
Ra	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Schoharie:				
ScB	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
SdC	Moderate: percs slowly, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.
SdD3	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.
[1]SEE:				
Schoharie part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cazenovia part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Stockbridge:				
SgB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
SgC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
SgD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
[1]ShB:				
Stockbridge part	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Stockbridge:				
Howard part	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
[1]ShC:				
Stockbridge part	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
Howard part	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
[1]ShD:				
Stockbridge part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
Howard part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
Swanton:				
Sw	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Teel:				
Te	Moderate: floods.	Moderate: floods.	Moderate: floods, wetness.	Slight.
Tuller:				
TuB	Severe: wetness.	Severe: wetness.	Severe: depth to rock, wetness, small stones.	Severe: wetness.
Volusia:				
VoA, VoB	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.
VoC	Moderate: wetness, percs slowly, slope.	Moderate: wetness, slope.	Severe: slope, percs slowly, wetness.	Moderate: wetness.
Wallkill:				
Wa	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Wampsville:				
WeA, WeB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
WeC	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: small stones.
WeD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones, slope.
Wareham:				
Wh	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Warners:				
Wk	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Wassaic:				
WmA	Slight	Slight	Moderate: small stones.	Slight.
WmB	Slight	Slight	Moderate: slope, small stones.	Slight.
WmC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Wayland:				
Wn	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.
Weaver:				
Wv	Moderate: floods.	Moderate: floods.	Moderate: floods.	Slight.
Willette:				
Ww	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 7.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Alden: Ad	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Alluvial land: AL	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Angola: An	Severe: depth to rock, wetness.	Severe: frost action, wetness.	Severe: depth to rock, wetness.	Severe: frost action, wetness.	Severe: frost action.
Appleton: AoA, AoB	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Arkport: ArB	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
ArC	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
ArD	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Arnot: AsB	Severe: depth to rock, small stones.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
AsC	Severe: depth to rock, small stones.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.
[1]ATF: Arnot part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Lordstown part	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Aurora: AuB	Severe: depth to rock, wetness.	Moderate: frost action, wetness.	Severe: depth to rock, wetness.	Moderate: frost action, slope, wetness.	Moderate: frost action.
AuC	Severe: depth to rock, wetness.	Moderate: frost action, slope, wetness.	Severe: depth to rock, wetness.	Severe: slope.	Moderate: frost action, slope.
AuD	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Bath: BaB	Moderate: wetness, small stones.	Moderate: frost action.	Moderate: wetness.	Moderate: frost action, slope.	Moderate: frost action.
BaC	Moderate: wetness, small stones, slope.	Moderate: frost action, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Bath:					
BaD, [1]BCE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Camillus:					
CaB	Moderate: depth to rock, wetness.	Moderate: frost action.	Severe: wetness.	Moderate: slope, frost action.	Moderate: frost action.
CaC	Moderate: slope, depth to rock, wetness.	Moderate: slope, frost action.	Severe: wetness.	Severe: slope.	Moderate: slope, frost action.
Canandaigua:					
Cd	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Carlisle:					
Ce	Severe: floods, wetness, cutbanks cave.	Severe: wetness, subsidence, floods.	Severe: wetness, subsidence, floods.	Severe: wetness, subsidence, floods.	Severe: wetness, low strength, excess humus.
Cazenovia:					
CfB	Moderate: wetness.	Moderate: frost action, wetness.	Moderate: wetness.	Moderate: frost action, slope, wetness.	Moderate: frost action.
CfC, CfC3	Moderate: wetness, slope.	Moderate: frost action, wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope.
CfD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Chenango:					
CgB	Severe: small stones, cutbanks cave.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Moderate: floods.
Chippewa:					
Ch	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Collamer:					
CkA	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.
CkB	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.
CkC	Severe: wetness.	Severe: frost action, slope.	Severe: wetness, slope.	Severe: slope, frost action.	Severe: frost action.
CkD	Severe: slope, wetness.	Severe: slope, frost action.	Severe: slope, wetness.	Severe: slope, frost action.	Severe: slope, frost action.
Colonie:					
ClA	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
ClB	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Conesus:					
CoB	Severe: wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: wetness, frost action, slope.	Moderate: frost action.
CoC	Severe: wetness.	Moderate: wetness, frost action, slope.	Severe: wetness.	Severe: slope.	Moderate: frost action, slope.
Edwards:					
Ed	Severe: floods, wetness, cutbanks cave.	Severe: floods, wetness, subsidence.	Severe: floods, wetness, subsidence.	Severe: floods, wetness, subsidence.	Severe: floods, wetness, low strength.
Elmwood:					
ElA, ElB	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.
Elnora:					
En	Severe: cutbanks cave, wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: frost action.
Farmington:					
FaB	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
[1]FGC:					
Farmington part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.
Wassaic part	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock.
Rock outcrop part.					
[1]FHF:					
Farmington part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop part.					
Fonda:					
Fo	Severe: wetness, too clayey.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.
Fredon:					
Fr	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Galen:					
GaA	Severe: wetness, cutbanks cave.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: frost action.
GaB	Severe: wetness, cutbanks cave.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: slope, wetness, frost action.	Moderate: frost action.
Halsey:					
Ha	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Hamlin:					
Hb	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, frost action.
Herkimer:					
HeB	Moderate: wetness, small stones, floods.	Severe: floods.	Severe: wetness, floods.	Severe: floods.	Moderate: frost action, floods.
Hilton:					
HlA, HlB	Severe: wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: frost action.
Honeoye:					
HnB	Moderate: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: frost action, slope.	Moderate: frost action.
HnC	Moderate: wetness, slope.	Moderate: frost action, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope.
HnD, HnE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]HOE:					
Honeoye part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Farmington part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Howard:					
HwA, HxA	Severe: small stones, cutbanks cave.	Slight	Slight	Slight	Slight.
HwB, HxB	Severe: small stones, cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
HxC	Severe: small stones, cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
HxD	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lairdsville:					
LaB	Moderate: depth to rock, too clayey.	Moderate: frost action, shrink-swell.	Moderate: depth to rock, wetness, shrink-swell.	Moderate: slope, frost action, shrink-swell.	Severe: low strength.
LbC	Moderate: slope, depth to rock, too clayey.	Moderate: slope, frost action, shrink-swell.	Moderate: slope, depth to rock, wetness.	Severe: slope.	Severe: low strength.
LbD3, LbE3	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
Lakemont:					
Lk	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Lamson:					
Lm	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Lansing:					
LsB	Moderate: small stones, wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: frost action, slope.	Moderate: frost action.
LsC	Moderate: small stones, wetness, slope.	Moderate: frost action, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope.
LsD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lima:					
LtA, LtB	Severe: wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: wetness, frost action, slope.	Moderate: frost action.
LtC	Severe: wetness.	Moderate: wetness, frost action, slope.	Severe: wetness.	Severe: slope.	Moderate: frost action, slope.
LuC	Severe: wetness.	Moderate: wetness, large stones, slope.	Severe: wetness.	Severe: slope.	Moderate: frost action, slope.
Lockport:					
LvA, LvB	Severe: wetness, too clayey.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: shrink-swell, wetness, low strength.
Lordstown:					
LwB	Severe: depth to rock.	Moderate: depth to rock, frost action.	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Moderate: depth to rock, frost action.
LwC	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.
LwD	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
[1]LXE:					
Lordstown part	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Arnot part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Lyons:					
Ly	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Mardin:					
MaB	Severe: wetness.	Moderate: frost action, wetness.	Severe: wetness.	Moderate: frost action, slope, wetness.	Moderate: frost action.
MaC	Severe: wetness.	Moderate: frost action, wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: frost action.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Mardin:					
MaD	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.
MDC	Severe: wetness.	Moderate: frost action, large stones, wetness.	Severe: wetness.	Severe: slope.	Moderate: frost action, slope.
Martisco:					
Mo	Severe: wetness, floods, cutbanks cave.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, low strength.
Middlebury:					
Mr	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Moderate: floods.
Minoa:					
Mt	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Naumburg:					
Na	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.
Niagara:					
NgA, NgB	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Odessa:					
Od	Severe: wetness, too clayey.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: low strength.
Ontario Variant:					
OnB	Moderate: wetness.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
OnC	Moderate: slope, wetness.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
Ovid:					
OvA, OvB	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Palms:					
Pb	Severe: wetness, cutbanks cave, floods.	Severe: wetness, floods, subsidence.	Severe: wetness, floods, subsidence.	Severe: wetness, floods, subsidence.	Severe: wetness, floods, low strength.
Palmyra:					
PgA	Moderate: small stones.	Slight	Slight	Slight	Slight.
PgB	Moderate: small stones.	Slight	Slight	Moderate: slope.	Slight.
PgC	Moderate: slope, small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Palmyra:					
PgD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PhB	Moderate: floods, small stones.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Moderate: floods.
[1]PKC:					
Palmyra part	Moderate: slope, small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Arkport part	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
[1]PKD:					
Palmyra part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Arkport part	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]PKE:					
Palmyra part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Arkport part	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]PME:					
Palmyra part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Howard part	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]PMF:					
Palmyra part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Howard part	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Phelps:					
PpA	Severe: wetness, cutbanks cave.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.
PpB	Severe: wetness, cutbanks cave.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.
Raynham:					
Ra	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: frost action, wetness.
Schoharie:					
ScB	Severe: too clayey.	Severe: low strength.	Severe: wetness, low strength.	Severe: low strength.	Severe: low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Schoharie:					
SdC	Severe: too clayey.	Severe: low strength.	Severe: wetness, low strength.	Severe: slope, low strength.	Severe: low strength.
SdD3	Severe: slope, too clayey.	Severe: slope, low strength.	Severe: slope, wetness, low strength.	Severe: slope, low strength.	Severe: slope, low strength.
[1]SEE:					
Schoharie part	Severe: slope, too clayey.	Severe: slope, low strength.	Severe: slope, wetness, low strength.	Severe: slope, low strength.	Severe: slope, low strength.
Cazenovia part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Stockbridge:					
SgB	Moderate: wetness, small stones.	Moderate: frost action.	Moderate: wetness.	Moderate: slope, frost action.	Moderate: frost action.
SgC	Moderate: slope, wetness, small stones.	Moderate: slope, frost action.	Moderate: slope, wetness.	Severe: slope.	Moderate: slope, frost action.
SgD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]ShB:					
Stockbridge part	Moderate: wetness, small stones.	Moderate: frost action.	Moderate: wetness.	Moderate: slope, frost action.	Moderate: frost action.
Howard part	Severe: small stones, cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
[1]ShC:					
Stockbridge part	Moderate: slope, wetness, small stones.	Moderate: slope, frost action.	Moderate: slope, wetness.	Severe: slope.	Moderate: slope, frost action.
Howard part	Severe: small stones, cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
[1]ShD:					
Stockbridge part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Howard part	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Swanton:					
Sw	Severe: wetness, too clayey, cutbanks cave.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Teel:					
Te	Severe: floods, wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Tuller:					
TuB	Severe: depth to rock, wetness.	Severe: wetness, depth to rock, frost action.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock, frost action.	Severe: depth to rock, wetness.
Volusia:					
VoA, VoB	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
VoC	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: slope, wetness, frost action.	Severe: frost action.
Wallkill:					
Wa	Severe: wetness, floods.	Severe: floods, wetness, subsidence.	Severe: floods, wetness, subsidence.	Severe: floods, wetness, subsidence.	Severe: wetness, floods, low strength.
Wampsville:					
WeA	Moderate: small stones.	Slight	Slight	Slight	Slight.
WeB	Moderate: small stones.	Slight	Slight	Moderate: slope.	Slight.
WeC	Moderate: small stones, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
WeD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wareham:					
Wh	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Warners:					
Wk	Severe: wetness, floods.	Severe: floods, wetness, frost action.	Severe: floods, wetness.	Severe: floods, wetness, frost action.	Severe: wetness, floods, frost action.
Wassaic:					
WmA	Severe: depth to rock.	Moderate: depth to rock, frost action.	Severe: depth to rock.	Moderate: depth to rock, frost action.	Moderate: depth to rock, frost action.
WmB	Severe: depth to rock.	Moderate: depth to rock, frost action.	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Moderate: depth to rock, frost action.
WmC	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.
Wayland:					
Wn	Severe: wetness, floods.	Severe: floods, wetness, frost action.	Severe: floods, wetness.	Severe: floods, wetness, frost action.	Severe: wetness, floods, frost action.
Weaver:					
Wv	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Moderate: floods.
Willette:					
Ww	Severe: wetness, cutbanks cave, floods.	Severe: wetness, floods, subsidence.	Severe: wetness, floods, subsidence.	Severe: wetness, floods, subsidence.	Severe: wetness, low strength, floods.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 8.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," "severe," and "poor." Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Alden:					
Ad	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Alluvial land:					
AL	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.	Poor: wetness.
Angola:					
An	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock.	Severe: depth to rock, wetness.	Severe: wetness.	Fair: thin layer.
Appleton:					
AoA	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Fair: thin layer.
AoB	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: thin layer.
Arkport:					
ArB	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
ArC	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope.
ArD	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage, slope.	Poor: slope.
Arnot:					
AsB	Severe: depth to rock.	Severe: depth to rock, small stones.	Severe: depth to rock.	Slight	Poor: small stones, thin layer, area reclaim.
AsC	Severe: depth to rock.	Severe: slope, depth to rock, small stones.	Severe: depth to rock.	Moderate: slope.	Poor: small stones, thin layer, area reclaim.
[1]ATF:					
Arnot part	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones, thin layer.
Lordstown part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Aurora:					
AuB	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock.	Severe: depth to rock, wetness.	Moderate: wetness.	Fair: thin layer.
AuC	Severe: depth to rock, wetness, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, wetness.	Moderate: wetness, slope.	Fair: thin layer, slope.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Aurora:					
AuD	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, wetness.	Severe: slope.	Poor: slope.
Bath:					
BaB	Severe: percs slowly.	Moderate: slope, small stones.	Moderate: wetness.	Moderate: wetness.	Fair: small stones.
BaC	Severe: percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: wetness, slope.	Fair: small stones, slope.
BaD	Severe: slope, percs slowly.	Severe: slope.	Moderate: wetness, slope.	Severe: slope.	Poor: slope.
[1]BCE	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Camillus:					
CaB	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: wetness.	Fair: thin layer.
CaC	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: wetness, slope.	Fair: slope, thin layer.
Canandaigua:					
Cd	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Carlisle:					
Ce	Severe: floods, wetness.	Severe: wetness, excess humus, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: excess humus, wetness, hard to pack.
Cazenovia:					
CfB	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: small stones, too clayey.
CfC, CfC3	Severe: percs slowly, wetness.	Severe: slope.	Moderate: wetness, too clayey.	Moderate: wetness, slope.	Fair: small stones, slope, too clayey.
CfD	Severe: slope, percs slowly.	Severe: slope.	Moderate: wetness, slope, too clayey.	Severe: slope.	Poor: slope.
Chenango:					
CgB	Moderate[2]: floods.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Chippewa:					
Ch	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Collamer:					
CkA	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Moderate: wetness.	Good.
CkB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Good.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Collamer:					
CkC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: slope, wetness.	Fair: slope.
CkD	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: slope.	Poor: slope.
Colonie:					
ClA, ClB	Slight[2]	Severe: seepage.	Severe: seepage.	Moderate: seepage.	Fair: too sandy.
Conesus:					
CoB	Severe: percs slowly, wetness.	Moderate: small stones, slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
CoC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope.
Edwards:					
Ed	Severe: floods, wetness.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, seepage.	Poor: excess humus, wetness, hard to pack.
Elmwood:					
ElA	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Moderate: wetness.	Fair: thin layer.
ElB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: thin layer.
Elnora:					
En	Severe[2]: wetness.	Severe: seepage, wetness.	Severe: wetness, seepage.	Severe: seepage.	Fair: too sandy.
Farmington:					
FaB	Severe[2]: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
FGC:					
Farmington part	Severe[2]: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim.
Wassaic part	Severe[2]: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer, small stones.
Rock outcrop part.					
FHF:					
Farmington part	Severe[2]: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Rock outcrop part.					
Fonda:					
Fo	Severe: wetness, percs slowly.	Moderate: excess humus.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Fredon: Fr	Severe[2]: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Fair: small stones, thin layer.
Galen: GaA, GaB	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: seepage, wetness.	Good.
Halsey: Ha	Severe[2]: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
Hamlin: Hb	Severe: floods.	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
Herkimer: HeB	Moderate: wetness, floods.	Moderate: seepage, small stones.	Moderate: wetness, floods.	Moderate: wetness, flooding.	Fair: small stones.
Hilton: HlA, HlB	Severe: percs slowly, wetness.	Moderate: small stones.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
Honeoye: HnB	Severe: percs slowly.	Moderate: slope, small stones.	Moderate: wetness.	Moderate: wetness.	Fair: small stones.
HnC	Severe: percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: wetness, slope.	Fair: small stones, slope.
HnD	Severe: slope, percs slowly.	Severe: slope.	Moderate: wetness, slope.	Severe: slope.	Poor: slope.
HnE	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
[1]HOE: Honeoye part	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Farmington part	Severe[2]: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Howard: HwA, HwB, HxA, HxB	Slight[2]	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, thin layer.
HxC	Moderate[2]: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, small stones, thin layer.
HxD	Severe[2]: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Lairdsville:					
LaB	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, wetness.	Severe: wetness.	Fair: thin layer, too clayey.
LbC	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, wetness.	Severe: wetness.	Fair: slope, thin layer, too clayey.
LbD3	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, wetness.	Severe: slope, wetness.	Poor: slope.
LbE3	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, wetness.	Poor: slope.
Lakemont:					
Lk	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Lamson:					
Lm	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
Lansing:					
LsB	Severe: percs slowly.	Moderate: slope, small stones.	Moderate: wetness.	Moderate: wetness.	Fair: small stones.
LsC	Severe: percs slowly.	Severe: slope.	Moderate: wetness,	Moderate: wetness, slope.	Fair: small stones, slope.
LsD	Severe: slope, percs slowly.	Severe: slope.	Moderate: wetness, slope.	Severe: slope.	Poor: slope.
Lima:					
LtA, LtB	Severe: percs slowly.	Moderate: small stones.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
LtC	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope.
LuC	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: large stones, slope.
Lockport:					
LvA, LvB	Severe: depth to rock, percs slowly, wetness.	Severe: depth to rock.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: thin layer, too clayey.
Lordstown:					
LwB	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: small stones, thin layer.
LwC	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Fair: slope.	Fair: small stones, thin layer, slope.
LwD	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Lordstown:					
[1]LXE:					
Lordstown part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Arnot part	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones, thin layer.
Lyons:					
Ly	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Mardin:					
MaB	Severe: percs slowly, wetness.	Moderate: small stones, slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
MaC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope.
MaD	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: slope.	Poor: slope.
MDC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: large stones, slope.
Martisco:					
Mo	Severe: wetness, percs slowly, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, floods, excess humus.	Severe: wetness, floods.	Poor: wetness, excess humus, hard to pack.
Middlebury:					
Mr	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, seepage.	Good.
Minoa:					
Mt	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness.	Severe: wetness.	Good.
Naumburg:					
Na	Severe[2]: wetness.	Severe: slope, wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Fair: too sandy, area reclaim.
Niagara:					
NgA	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Good.
NgB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Good.
Odessa:					
Od	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
Ontario Variant:					
OnB	Slight	Moderate: slope, seepage, small stones.	Slight	Slight	Fair: small stones.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ontario Variant:					
OnC	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: slope, small stones.
Ovid:					
OvA	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Fair: thin layer, too clayey.
OvB	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: thin layer, too clayey.
Palms:					
Pb	Severe: wetness, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, seepage.	Poor: excess humus, hard to pack, wetness.
Palmyra:					
PgA, PgB	Slight[2]	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
PgC	Moderate[2]: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, small stones.
PgD	Severe[2]: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
PhB	Moderate[2]: floods, wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Fair: small stones, thin layer.
[1]PKC:					
Palmyra part	Moderate[2]: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, small stones.
Arkport part	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope.
[1]PKD:					
Palmyra part	Severe[2]: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
Arkport part	Severe[1]: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
[1]PKE:					
Palmyra part	Severe[2]: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Arkport part	Severe[1]: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
[1]PME:					
Palmyra part	Severe[2]: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Howard part	Severe[2]: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Palmyra:					
[1]PMF:					
Palmyra part	Severe[2]: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Howard part	Severe[2]: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Phelps:					
PpA, PpB	Severe[2]: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: thin layer, area reclaim, small stones.
Raynham:					
Ra	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Fair: thin layer.
Schoharie:					
ScB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
SdC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
SdD3	Severe: slope, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: slope, wetness.	Poor: slope, too clayey.
[1]SEE:					
Schoharie part	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, wetness, too clayey.	Severe: slope, wetness.	Poor: slope, too clayey.
Cazenovia part	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Stockbridge:					
SgB	Severe: percs slowly.	Moderate: slope, small stones.	Moderate: wetness.	Moderate: wetness.	Fair: small stones.
SgC	Severe: percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: slope, wetness.	Fair: slope, small stones.
SgD	Severe: slope, percs slowly.	Severe: slope.	Moderate: wetness, slope.	Severe: slope.	Poor: slope.
[1]ShB:					
Stockbridge part	Severe: percs slowly.	Moderate: slope, small stones.	Moderate: wetness.	Moderate: wetness.	Fair: small stones.
Howard part	Slight[2]	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, thin layer.
[1]ShC:					
Stockbridge part	Severe: percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: slope, wetness.	Fair: slope, small stones.
Howard part	Moderate[2]: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, small stones, thin layer.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Stockbridge:					
[1]ShD:					
Stockbridge part	Severe: slope, percs slowly.	Severe: slope.	Moderate: wetness.	Severe: slope.	Poor: slope.
Howard part	Severe[2]: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
Swanton:					
Sw	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness.
Teel:					
Te	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, seepage.	Good.
Tuller:					
TuB	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: thin layer, area reclaim.
Volusia:					
VoA	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones, thin layer.
VoB	Severe: wetness, percs slowly.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones, thin layer.
VoC	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: small stones, slope, thin layer.
Wallkill:					
Wa	Severe: floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: wetness.
Wampsville:					
WeA, WeB	Slight[2]	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
WeC	Moderate[2]: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
WeD	Severe[2]: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
Wareham:					
Wh	Severe[2]: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
Warners:					
Wk	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, wetness.	Poor: wetness.
Wassaic:					
WmA, WmB	Severe[2]: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer, small stones.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Wassaic:					
WmC	Severe[2]: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer, small stones.
Wayland:					
Wn	Severe: floods, wetness, percs slowly.	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Weaver:					
Wv	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, seepage.	Good.
Willette:					
Ww	Severe: wetness, floods, percs slowly.	Severe: wetness, excess humus, floods.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, seepage.	Poor: excess humus, hard to pack, wetness.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

[2]Excessive permeability or depth to fractured bedrock may permit ground water pollution.

TABLE 9.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Alden:				
Ad	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Alluvial land:				
AL	Poor: wetness, area reclaim.	Poor: excess fines.	Poor: excess fines.	Poor: wetness, small stones.
Angola:				
An	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, small stones.
Appleton:				
AoA, AoB	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones.
Arkport:				
ArB, ArC	Fair: low strength.	Fair: excess fines.	Unsuited: excess fines.	Fair: thin layer.
ArD	Fair: low strength.	Fair: excess fines.	Unsuited: excess fines.	Poor: slope.
Arnot:				
AsB, AsC	Poor: thin layer, area reclaim.	Poor: excess fines, thin layer.	Poor: thin layer.	Poor: small stones.
[1]ATF:				
Arnot part	Poor: slope, thin layer, area reclaim.	Poor: excess fines, thin layer.	Poor: thin layer.	Poor: slope, small stones.
Lordstown part	Poor: slope, thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Aurora:				
AuB, AuC	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, small stones.
AuD	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Bath:				
BaB, BaC	Fair: frost action.	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
BaD	Fair: frost action, slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
[1]BCE	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Camillus:				
CaB	Fair: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones.
CaC	Fair: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Canandaigua:				
Cd	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Carlisle:				
Ce	Poor: frost action, excess humus, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Cazenovia:				
CfB	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones, thin layer.
CfC, CfC3	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, small stones.
CfD	Fair: frost action, low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Chenango:				
CgB	Good	Fair: small stones.	Good	Poor: small stones.
Chippewa:				
Ch	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Collamer:				
CkA, CkB	Poor: frost action.	Poor: excess fines.	Unsuited: excess fines.	Good.
CkC	Poor: frost action.	Poor: excess fines.	Unsuited: excess fines.	Fair: slope.
CkD	Poor: frost action.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
Colonie:				
ClA, ClB	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Conesus:				
CoB	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones, thin layer.
CoC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, small stones.
Edwards:				
Ed	Poor: frost action, excess humus, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Elmwood:				
ElA, ElB	Poor: thin layer, frost action.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Good.
Elnora:				
En	Fair: frost action.	Fair: excess fines.	Unsuited: excess fines.	Poor: area reclaim, too sandy.
Farmington:				
FaB	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: thin layer.	Poor: area reclaim, small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Farmington:				
[1]FGC:				
Farmington part	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: thin layer.	Poor: area reclaim, small stones.
Wassaic part	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Fair: slope, small stones, thin layer.
Rock outcrop part.				
[1]FHF:				
Farmington part	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: thin layer.	Poor: slope, area reclaim, small stones.
Rock outcrop part.				
Fonda:				
Fo	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Fredon:				
Fr	Fair: wetness.	Poor: thin layer.	Fair: excess fines.	Poor: wetness, small stones, thin layer.
Galen:				
GaA, GaB	Fair: frost action.	Fair: excess fines.	Unsuited: excess fines.	Good.
Halsey:				
Ha	Poor: wetness.	Fair: excess fines, thin layer.	Fair: excess fines.	Poor: wetness.
Hamlin:				
Hb	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Herkimer:				
HeB	Fair: frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
Hilton:				
HlA, HlB	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones, thin layer.
Honeoye:				
HnB	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones, thin layer.
HnC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, small stones, thin layer.
HnD	Fair: frost action, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
HnE	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
[1]HOE:				
Honeoye part	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Farmington part	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: thin layer.	Poor: slope, area reclaim, small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Howard:				
HwA, HwB, HxA, HxB, HxC	Good	Poor: excess fines, thin layer.	Good	Poor: small stones.
HxD	Fair: slope.	Poor: excess fines, thin layer.	Good	Poor: slope, small stones.
Lairdsville:				
LaB	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
LbC	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, too clayey, thin layer.
LbD3	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
LbE3	Poor: low strength, thin layer, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Lakemont:				
Lk	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Lamson:				
Lm	Poor: wetness, frost action.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.
Lansing:				
LsB, LsC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
LsD	Fair: frost action, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
Lima:				
LtA, LtB	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, small stones.
LtC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer, small stones.
LuC	Fair: frost action.	Unsuited: large stones, excess fines.	Unsuited: large stones, excess fines.	Poor: large stones.
Lockport:				
LvA, LvB	Poor: thin layer, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
Lordstown:				
LwB, LwC	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
LwD	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
[1]LXE:				
Lordstown part	Poor: slope, thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Lordstown:				
Arnot part	Poor: slope, thin layer, area reclaim.	Poor: excess fines, thin layer.	Poor: thin layer.	Poor: slope, small stones.
Lyons:				
Ly	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Mardin:				
MaB, MaC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
MaD	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
MDC	Fair: frost action.	Unsuited: large stones, excess fines.	Unsuited: large stones, excess fines.	Poor: large stones.
Martisco:				
Mo	Poor: wetness, excess humus, frost action.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.
Middlebury:				
Mr	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Minoa:				
Mt	Poor: frost action.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Naumburg:				
Na	Fair: wetness, area reclaim.	Fair: excess fines.	Unsuited: excess fines.	Poor: wetness, too sandy.
Niagara:				
NgA, NgB	Poor: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Odessa:				
Od	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
Ontario Variant:				
OnB	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones.
OnC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, small stones.
Ovid:				
OvA, OvB	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Palms:				
Pb	Poor: wetness, excess humus, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.
Palmyra:				
PgA, PgB, PgC, PhB	Good	Good	Good	Poor: small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Palmyra:				
PgD	Fair: slope.	Good	Good	Poor: slope, small stones.
[1]PKC:				
Palmyra part	Good	Good	Good	Poor: small stones.
Arkport part	Fair: low strength.	Fair: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
[1]PKD:				
Palmyra part	Fair: slope.	Good	Good	Poor: slope, small stones.
Arkport part	Fair: slope, low strength.	Fair: excess fines.	Unsuited: excess fines.	Poor: slope.
[1]PKE:				
Palmyra part	Poor: slope.	Good	Good	Poor: slope, small stones.
Arkport part	Poor: slope.	Fair: excess fines.	Unsuited: excess fines.	Poor: slope.
[1]PME:				
Palmyra part	Poor: slope.	Good	Good	Poor: slope, small stones.
Howard part	Poor: slope.	Poor: excess fines, thin layer.	Good	Poor: slope, small stones.
[1]PMF:				
Palmyra part	Poor: slope.	Good	Good	Poor: slope, small stones.
Howard part	Poor: slope.	Poor: excess fines, thin layer.	Good	Poor: slope, small stones.
Phelps:				
PpA, PpB	Good	Good	Good	Poor: small stones.
Raynham:				
Ra	Poor: frost action, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Schoharie:				
ScB, SdC	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
SdD3	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
[1]SEE:				
Schoharie part	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Cazenovia part	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Stockbridge:				
SgB, SgC	Fair: frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
SgD	Fair: slope, frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
[1]ShB:				
Stockbridge part	Fair: frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
Howard part	Good	Poor: excess fines, thin layer.	Good	Poor: small stones.
[1]ShC:				
Stockbridge part	Fair: frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
Howard part	Good	Poor: excess fines, thin layer.	Good	Poor: small stones.
[1]ShD:				
Stockbridge part	Fair: slope, frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Howard part	Fair: slope.	Poor: excess fines, thin layer.	Good	Poor: slope, small stones.
Swanton:				
Sw	Poor: wetness, frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Teel:				
Te	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Tuller:				
TuB	Poor: thin layer.	Unsuited: excess fines, thin layer.	Unsuited: excess fines, thin layer.	Poor: small stones.
Volusia:				
VoA, VoB, VoC	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Wallkill:				
Wa	Poor: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Wampsville:				
WeA, WeB, WeC	Good	Poor: excess fines.	Fair: excess fines.	Poor: small stones.
WeD	Fair: slope.	Poor: excess fines.	Fair: excess fines.	Poor: slope, small stones.
Wareham:				
Wh	Poor: wetness.	Fair: excess fines.	Unsuited: excess fines.	Poor: wetness.
Warners:				
Wk	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Wassaic:				
WmA, WmB	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Fair: small stones, thin layer.
WmC	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Fair: slope, small stones, thin layer.
Wayland:				
Wn	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Weaver:				
Wv	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: excess lime.
Willette:				
Ww	Poor: excess humus, low strength, frost action.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 10.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Alden:						
Ad	Favorable	Favorable	Favorable	Wetness, percs slowly, poor outlets.	Wetness	Wetness.
Alluvial land:						
AL	Seepage	Piping, low strength.	Favorable	Floods, wetness, cutbanks cave.	Not needed	Not needed.
Angola:						
An	Depth to rock	Thin layer	Depth to rock	Depth to rock	Not needed	Rooting depth.
Appleton:						
AoA, AoB	Favorable	Favorable	Favorable	Percs slowly	Percs slowly	Percs slowly.
Arkport:						
ArB, ArC, ArD	Seepage, slope.	Seepage, piping, erodes easily.	No water, cutbanks cave.	Not needed	Not needed	Droughty, erodes easily.
Arnot:						
AsB, AsC	Depth to rock, slope, seepage.	Thin layer, depth to rock.	Depth to rock	Not needed	Depth to rock, slope.	Droughty, rooting depth, slope.
[1]ATF:						
Arnot part	Depth to rock, slope.	Thin layer, depth to rock.	Depth to rock	Not needed	Depth to rock, slope.	Droughty, rooting depth, slope.
Lordstown part	Depth to rock, slope, seepage.	Thin layer, depth to rock.	Deep to water, depth to rock.	Not needed	Depth to rock, rooting depth, slope.	Droughty, slope, rooting depth.
Aurora:						
AuB, AuC, AuD	Depth to rock, slope.	Thin layer, depth to rock.	Depth to rock	Depth to rock, percs slowly.	Depth to rock, percs slowly.	Rooting depth, erodes easily.
Bath:						
BaB, BaC, BaD, [1]BCE	Favorable, slope.[2]	Favorable	No water	Not needed	Percs slowly, erodes easily, slope.	Percs slowly, slope, erodes easily.
Camillus:						
CaB, CaC	Depth to rock, slope.	Depth to rock, low strength, erodes easily.	Deep to water, depth to rock.	Depth to rock, slope.	Depth to rock, slope, erodes easily.	Rooting depth, erodes easily.
Canandaigua:						
Cd	Favorable	Low strength, unstable fill, piping.	Slow refill	Poor outlets, cutbanks cave.	Not needed	Wetness.
Carlisle:						
Ce	Seepage, excess humus.	Excess humus, unstable fill.	Subsidence	Wetness, cutbanks cave, poor outlets.	Not needed	Not needed.
Cazenovia:						
CfB, CfC, CfC3, CfD	Favorable	Favorable	Deep to water	Percs slowly, slope.	Slope, erodes easily, percs slowly.	Slope, erodes easily.
Chenango:						
CgB	Seepage	Seepage	Deep to water	Floods	Not needed	Favorable.

See footnotes at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Chippewa:						
Ch	Favorable	Favorable	Favorable	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Collamer:						
CkA, CkB, CkC, CkD	Slope	Low strength, seepage, piping.	Slow refill, cutbanks cave.	Cutbanks cave, complex slope.	Erodes easily, complex slope.	Erodes easily, piping, slope.
Colonie:						
ClA, ClB	Seepage	Seepage, piping, erodes easily.	No water, cutbanks cave.	Not needed	Not needed	Droughty, soil blowing.
Conesus:						
CoB, CoC	Favorable, slope.[2]	Favorable	Deep to water	Percs slowly, slope.	Erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Edwards:						
Ed	Seepage, excess humus.	Hard to pack, low strength, unstable fill.	Subsidence	Wetness, cutbanks cave, poor outlets.	Not needed	Not needed.
Elmwood:						
ElA, ElB	Seepage	Piping	Deep to water, cutbanks cave.	Percs slowly, frost action, cutbanks cave.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Elnora:						
En	Seepage	Seepage, unstable fill.	Deep to water, cutbanks cave.	Cutbanks cave	Too sandy	Droughty.
Farmington:						
FaB	Depth to rock, seepage.	Depth to rock, thin layer.	Depth to rock	Not needed	Depth to rock	Rooting depth.
[1]FGC:						
Farmington part	Slope, depth to rock.	Depth to rock, thin layer.	Depth to rock	Not needed	Slope, depth to rock.	Slope, rooting depth.
Wassaic part	Slope, depth to rock.	Depth to rock	Depth to rock	Not needed	Slope, depth to rock.	Slope, rooting depth.
Rock outcrop part.						
[1]FHF:						
Farmington part	Slope, depth to rock.	Depth to rock, no water.	Depth to rock	Not needed	Slope, depth to rock.	Slope, rooting depth.
Rock outcrop part.						
Fonda:						
Fo	Favorable	Low strength, hard to pack.	Favorable	Wetness, percs slowly, poor outlets.	Not needed	Wetness.
Fredon:						
Fr	Seepage	Seepage	Favorable	Poor outlets	Wetness	Wetness.
Galen:						
GaA, GaB	Seepage	Seepage, piping.	Deep to water, cutbanks cave.	Cutbanks cave	Piping, too sandy.	Erodes easily, piping.
Halsey:						
Ha	Seepage	Seepage	Favorable	Wetness, poor outlets.	Not needed	Wetness.

See footnotes at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Hamlin:						
Hb	Favorable	Piping, low strength.	Deep to water, cutbanks cave.	Not needed	Not needed	Erodes easily, piping.
Herkimer:						
HeB	Seepage	Seepage	Deep to water	Not needed	Favorable	Favorable.
Hilton:						
HlA, HlB	Favorable	Favorable	Deep to water	Percs slowly, slope.	Erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Honeoye:						
HnB, HnC, HnD, HnE	Slope	Favorable	No water	Not needed	Erodes easily, slope.	Slope, erodes easily.
[1]HOE:						
Honeoye part	Slope	Favorable	No water	Not needed	Erodes easily, slope.	Slope, erodes easily.
Farmington part	Slope, depth to rock.	Depth to rock, thin layer.	Depth to rock	Not needed	Slope, depth to rock.	Slope, rooting depth.
Howard:						
HwA, HwB, HxA, HxB, HxC, HxD	Seepage, slope.	Seepage	No water	Not needed	Not needed	Droughty, slope.
Lairdsville:						
LaB, LbC, LbD3, LbE3	Depth to rock, slope.	Low strength, thin layer.	Depth to rock, slow refill.	Depth to rock, percs slowly.	Depth to rock, erodes easily, percs slowly.	Erodes easily, rooting depth.
Lakemont:						
Lk	Favorable	Low strength, piping.	Favorable	Wetness, percs slowly, poor outlets.	Not needed	Wetness, percs slowly.
Lamson:						
Lm	Seepage	Piping, unstable fill.	Favorable	Wetness, poor outlets.	Not needed	Wetness, piping.
Lansing:						
LsB, LsC, LsD	Slope	Favorable	No water	Not needed	Erodes easily, slope.	Slope, erodes easily.
Lima:						
LtA, LtB, LtC	Favorable, slope.[2]	Favorable	Deep to water	Percs slowly, slope.	Erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
LuC	Slope	Large stones	Deep to water, large stones.	Percs slowly, slope, large stones.	Large stones, erodes easily, percs slowly.	Large stones, percs slowly, slope.
Lockport:						
LvA, LvB	Depth to rock	Low strength, thin layer.	Depth to rock, slow refill.	Depth to rock, percs slowly, wetness.	Depth to rock, percs slowly.	Percs slowly, rooting depth, wetness.
Lordstown:						
LwB, LwC, LwD	Depth to rock, slope, seepage.	Thin layer, depth to rock.	Deep to water, depth to rock.	Not needed	Depth to rock, rooting depth, slope.	Droughty, slope, rooting depth.
[1]LXE:						
Lordstown part	Depth to rock, slope, seepage.	Thin layer, depth to rock.	Deep to water, depth to rock.	Not needed	Depth to rock, rooting depth, slope.	Droughty, slope, rooting depth.

See footnotes at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Lordstown:						
Arnot part	Depth to rock, slope.	Thin layer, depth to rock.	Depth to rock	Not needed	Depth to rock, slope.	Droughty, rooting depth, slope.
Lyons:						
Ly	Favorable	Favorable	Favorable	Wetness, percs slowly, poor outlets.	Not needed	Wetness.
Mardin:						
MaB, MaC, MaD	Favorable, slope.[2]	Favorable	Deep to water	Percs slowly, slope.	Percs slowly, slope, rooting depth.	Percs slowly, slope, rooting depth.
MDC	Slope	Large stones	Deep to water, large stones,	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.
Martisco:						
Mo	Excess humus	Low strength, unstable fill, hard to pack.	Subsidence	Percs slowly, poor outlets, wetness.	Not needed	Not needed.
Middlebury:						
Mr	Favorable	Piping, low strength.	Deep to water, cutbanks cave.	Floods, poor outlets.	Not needed	Erodes easily, piping.
Minoa:						
Mt	Seepage, slope.	Seepage, piping, low strength.	Cutbanks cave	Favorable	Not needed	Piping.
Naumburg:						
Na	Seepage	Piping, seepage.	Cutbanks cave	Cutbanks cave, wetness.	Not needed	Piping.
Niagara:						
NgA, NgB	Favorable	Low strength, piping.	Slow refill, cutbanks cave.	Cutbanks cave	Erodes easily, piping.	Erodes easily, piping.
Odessa:						
Od	Favorable	Low strength	Slow refill	Percs slowly	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Ontario Variant:						
OnB, OnC	Slope	Seepage	No water	Not needed	Erodes easily, slope.	Slope, erodes easily.
Ovid:						
OvA, OvB	Favorable	Favorable	Favorable	Percs slowly	Percs slowly	Percs slowly.
Palms:						
Pb	Seepage, excess humus.	Hard to pack, low strength, unstable fill.	Subsidence	Wetness, cutbanks cave, poor outlets.	Not needed	Not needed.
Palmyra:						
PgA, PgB, PgC, PgD	Seepage, slope.	Piping, seepage.	No water	Not needed	Not needed	Slope.
PhB	Seepage	Seepage, piping.	Deep to water	Not needed	Not needed	Favorable.
[1]PKC:						
Palmyra part	Seepage, slope.	Piping, seepage.	No water	Not needed	Not needed	Slope.

See footnotes at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Palmyra:						
Arkport part	Seepage, slope.	Seepage, piping, erodes easily.	No water, cutbanks cave.	Not needed	Not needed	Droughty, erodes easily.
[1]PKD:						
Palmyra part	Seepage, slope.	Piping, seepage.	No water	Not needed	Not needed	Slope.
Arkport part	Seepage, slope.	Seepage, piping, erodes easily.	No water, cutbanks cave.	Not needed	Not needed	Droughty, erodes easily.
[1]PKE:						
Palmyra part	Seepage, slope.	Piping, seepage.	No water	Not needed	Not needed	Slope.
Arkport part	Seepage, slope.	Seepage, piping, erodes easily.	No water, cutbanks cave.	Not needed	Not needed	Droughty, erodes easily.
[1]PME:						
Palmyra part	Seepage, slope.	Piping, seepage.	No water	Not needed	Not needed	Slope.
Howard part	Seepage, slope.	Seepage	No water	Not needed	Not needed	Droughty, slope.
[1]PMF:						
Palmyra part	Seepage, slope.	Piping, seepage.	No water	Not needed	Not needed	Slope.
Howard part	Seepage, slope.	Seepage	No water	Not needed	Not needed	Droughty, slope.
Phelps:						
PpA, PpB	Seepage	Seepage, piping.	Deep to water	Favorable	Piping	Favorable.
Raynham:						
Ra	Favorable	Piping, low strength.	Cutbanks cave	Percs slowly, cutbanks cave.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Schoharie:						
ScB, SdC, SdD3	Slope	Low strength	Deep to water	Percs slowly, slope.	Slope, percs slowly, erodes easily.	Slope, percs slowly, erodes easily.
[1]SEE:						
Schoharie part	Slope	Low strength	Deep to water	Percs slowly, slope.	Slope, percs slowly, erodes easily.	Slope, percs slowly, erodes easily.
Cazenovia part	Slope	Favorable	Deep to water	Percs slowly, slope.	Slope, erodes easily.	Slope, erodes easily.
Stockbridge:						
SgB, SgC, SgD	Slope	Seepage	No water	Not needed	Slope	Slope.
[1]ShB:						
Stockbridge part	Favorable	Seepage	No water	Not needed	Slope	Slope.
Howard part	Seepage	Seepage	No water	Not needed	Not needed	Droughty, slope.
[1]ShC:						
Stockbridge part	Slope	Seepage	No water	Not needed	Slope	Slope.
Howard part	Seepage, slope.	Seepage	No water	Not needed	Not needed	Droughty, slope.

See footnotes at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Stockbridge:						
[1]ShD:						
Stockbridge part	Slope----------	Seepage--------	No water-------	Not needed-----	Slope, percs slowly.	Slope.
Howard part-----	Seepage, slope.	Seepage--------	No water-------	Not needed-----	Not needed-----	Droughty, slope.
Swanton:						
Sw---------------	Favorable------	Piping, low strength.	Favorable------	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Teel:						
Te---------------	Favorable------	Piping, low strength.	Deep to water, cutbanks cave.	Floods, poor outlets.	Not needed-----	Erodes easily, piping.
Tuller:						
TuB--------------	Depth to rock, seepage.	Thin layer, depth to rock.	Slow refill, depth to rock.	Depth to rock-	Depth to rock--	Rooting depth, droughty.
Volusia:						
VoA, VoB, VoC----	Favorable, slope.[2]	Favorable------	Favorable------	Percs slowly---	Percs slowly, rooting depth.	Wetness, percs slowly, rooting depth.
Wallkill:						
Wa---------------	Seepage--------	Low strength, unstable fill.	Subsidence-----	Wetness, poor outlets, floods.	Not needed-----	Wetness.
Wampsville:						
WeA, WeB, WeC, WeD--------------	Seepage, slope.	Seepage, piping.	No water-------	Not needed-----	Complex slopes--	Slope.
Wareham:						
Wh---------------	Seepage--------	Piping, seepage.	Favorable------	Wetness-------- poor outlets.	Piping, wetness.	Wetness.
Warners:						
Wk---------------	Favorable------	Piping---------	Favorable------	Wetness, floods, poor outlets.	Not needed-----	Wetness.
Wassaic:						
WmA, WmB, WmC----	Slope, depth to rock.	Depth to rock--	Depth to rock--	Not needed-----	Depth to rock--	Slope, rooting depth.
Wayland:						
Wn---------------	Favorable------	Piping, low strength.	Favorable------	Wetness, floods, poor outlets.	Not needed-----	Wetness, erodes easily.
Weaver:						
Wv---------------	Favorable------	Piping, low strength.	Deep to water, cutbanks cave.	Floods, poor outlets.	Not needed-----	Erodes easily, piping.
Willette:						
Ww---------------	Seepage, excess humus.	Hard to pack, low strength, unstable fill.	Subsidence-----	Wetness, cutbanks cave, poor outlets.	Not needed-----	Not needed.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.
[2]Slope of more than 8 percent is a restrictive soil feature for the specified use.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. NP means nonplastic]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Alden:											
Ad	0-7	Mucky silt loam	ML, OL	A-5, A-7	0	95-100	85-100	70-95	60-85	40-50	5-15
	7-19	Silt loam, loam, very fine sandy loam.	CL, SM, CL-ML	A-4, A-6	0	95-100	85-100	70-95	40-85	20-35	5-15
	19-60	Gravelly loam, silt loam.	CL, GC, SC, CL-ML	A-2, A-4, A-6	0-5	60-95	50-90	45-90	30-85	20-35	5-15
Alluvial land:											
AL	0-60	Variable	---	---	0-35	---	---	---	---	---	---
Angola:											
An	0-10	Silt loam	CL	A-6, A-7	0	95-100	90-100	80-100	65-95	35-45	11-20
	10-22	Silty clay loam, shaly silt loam.	CL, SC	A-6	0-5	65-100	55-95	50-95	40-90	25-35	11-20
	22	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Appleton:											
AoA, AoB	0-12	Loam	ML, SM	A-4, A-6, A-7	0	80-100	75-90	65-85	45-70	35-45	10-15
	12-24	Loam, sandy clay loam, gravelly silt loam.	CL, SC, GC, CL-ML	A-4, A-6, A-2	0-5	65-95	60-90	50-85	25-80	20-30	5-10
	24-62	Loam, gravelly silt loam, gravelly fine sandy loam.	CL, SC, GC, CL-ML	A-4, A-2	0-5	65-90	60-85	40-80	30-75	15-25	5-10
Arkport:											
ArB, ArC, ArD	0-10	Fine sandy loam	SM, ML	A-4	0	100	95-100	65-85	40-55	<15	NP-6
	10-20	Very fine sandy loam, loamy very fine sand, loamy fine sand.	SM, ML	A-2, A-4	0	100	95-100	70-95	30-65	<15	NP-4
	20-57	Very fine sand, loamy fine sand, loamy very fine sand.	SM, ML	A-2, A-4	0	100	95-100	65-95	20-60	---	NP
	57-68	Loamy fine sand, fine sand, loamy very fine sand.	SM	A-2, A-4	0	100	95-100	60-95	15-50	---	NP
Arnot:											
AsB, AsC	0-1	Channery silt loam.	ML, GM, SM	A-4	5-10	65-85	55-80	50-80	40-70	<30	NP-5
	1-17	Very channery silt loam, very channery loam.	GM, GM-GC	A-2, A-4	10-25	50-65	40-60	35-55	30-50	<30	NP-5
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]ATF:											
Arnot part	0-1	Very channery silt loam, flaggy silt loam.	ML, GM, GM-GC	A-2, A-4	10-25	50-85	40-80	35-80	30-70	<30	NP-5
	1-17	Very channery silt loam, very channery loam.	GM, GM-GC	A-2, A-4	10-25	50-65	40-60	35-55	30-50	<30	NP-5
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Arnot:											
Lordstown part---	0-4	Channery silt loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	4-28	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Aurora:											
AuB, AuC, AuD-----	0-9	Silt loam--------	CL	A-6	0	80-100	75-90	70-95	55-80	30-40	11-20
	9-34	Silty clay loam, shaly silty clay loam, silt loam.	CL	A-6	0-5	65-100	60-90	55-95	50-90	25-35	11-20
	34	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Bath:											
BaB, BaC, BaD, [1]BCE---------------	0-7	Channery silt loam, flaggy silt loam.	ML, GM, SM	A-1, A-2, A-4	5-15	60-85	50-80	40-75	35-70	33-45	5-10
	7-30	Channery loam, gravelly loam, silt loam.	ML, SM, GM	A-1, A-2, A-4	5-10	65-95	50-90	40-85	25-80	20-34	NP-7
	30-55	Channery loam, very channery silt loam, loam.	SM, GM, GM-GC, ML	A-1, A-2, A-4	10-15	40-90	30-85	30-85	20-75	20-24	3-6
Camillus:											
CaB, CaC-----------	0-8	Silt loam--------	CL, SM, CL-ML	A-4, A-6	0-5	85-100	75-100	60-95	45-90	25-35	5-15
	8-18	Silt loam--------	CL, ML	A-6	0-5	85-100	75-100	65-95	55-90	25-35	3-12
	18-38	Shaly silt loam, very shaly silt loam.	GM, GC, CL, ML	A-2, A-4, A-1	0-5	40-80	25-75	20-75	15-65	20-35	3-15
	38	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Canandaigua:											
Cd-----------------	0-8	Silt loam--------	ML, OL, MH, OH	A-4, A-5, A-6, A-7	0	95-100	95-100	90-100	70-90	35-55	5-15
	8-26	Silt loam, very fine sandy loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	70-95	20-40	5-15
	26-62	Silt loam, very fine sandy loam.	CL, CL-ML	A-4	0	95-100	95-100	90-100	70-95	20-30	3-10
Carlisle:											
Ce-----------------	0-73	Sapric material--	PT	A-8	---	---	---	---	---	---	---
Cazenovia:											
CfB, CfC, CfC3, CfD----------------	0-11	Silt loam--------	ML	A-4, A-6, A-7	0	80-100	75-100	70-95	55-90	35-45	5-15
	11-29	Silty clay loam, clay loam, gravelly clay loam.	CL, CL-ML	A-4, A-6	0-5	65-100	65-95	60-95	55-90	25-35	5-15
	29-52	Gravelly silty clay loam, gravelly loam, silt loam.	CL, GC, CL-ML, GM-GC	A-4, A-6, A-2	0-5	55-90	50-90	40-85	30-80	20-35	5-15

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Chenango:											
CgB----------------	0-10	Channery silt loam.	ML, SM, GM	A-4	5-15	60-85	55-80	50-80	40-70	<35	NP-10
	10-34	Channery silt loam, channery loam, very gravelly fine sandy loam.	ML, GM, SM	A-2, A-4, A-1	5-20	45-85	35-75	30-75	15-65	<35	NP-10
	34-60	Very gravelly loamy coarse sand, very channery coarse sand, very gravelly loamy fine sand.	GW, GP, GM, SM	A-1	5-20	35-55	25-50	15-45	2-20	---	NP
Chippewa:											
Ch-----------------	0-14	Silt loam--------	ML, OL	A-5, A-7	0-5	80-100	75-100	65-95	55-85	40-50	5-15
	14-42	Channery silt loam, channery loam, very channery loam.	CL, GC, CL-ML, SC	A-2, A-4	5-15	60-80	55-70	45-70	30-65	15-25	5-10
	42-58	Channery silt loam, channery loam, very channery loam.	GM, CL, GC, CL-ML	A-2, A-4	10-25	60-80	55-70	45-70	30-65	25-35	5-10
Collamer:											
CkA, CkB, CkC, CkD	0-7	Silt loam--------	CL, CL-ML	A-4	0	95-100	90-100	80-95	65-85	20-30	5-10
	7-16	Silt loam, very fine sandy loam, fine sandy loam.	CL, SC, CL-ML, SM-SC	A-4	0	95-100	95-100	65-95	40-85	20-30	5-10
	16-26	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	75-95	20-30	5-15
	26-60	Stratified silt to very fine sand.	ML, SM	A-4	0	95-100	95-100	70-100	40-90	<15	NP-4
Colonie:											
ClA, ClB-----------	0-7	Loamy fine sand	SM	A-2, A-4	0	100	95-100	65-85	20-40	---	NP
	7-54	Loamy fine sand, fine sand, very fine sand.	SM	A-2, A-4	0	100	95-100	65-85	20-50	---	NP
	54-63	Fine sand--------	SM	A-2	0	100	95-100	60-80	20-35	---	NP
Conesus:											
CoB, CoC-----------	0-8	Silt loam--------	CL-ML	A-4, A-6	0	80-100	75-95	70-90	55-85	25-35	5-15
	8-43	Gravelly silt loam, loam, gravelly loam.	CL, GC, CL-ML, SC	A-4, A-6	0-5	60-95	55-95	45-90	40-85	20-30	5-15
	43-60	Gravelly loam, gravelly silt loam, very gravelly loam.	CL, GC, CL-ML	A-4, A-2, A-6	5-10	55-80	50-70	40-65	30-60	20-30	5-15
Edwards:											
Ed-----------------	0-35	Sapric material-	PT	A-8	0	---	---	---	---	---	---
	35-60	Marl-------------	---	---	0	100	95-100	80-90	60-80	---	---
Elmwood:											
ElA, ElB-----------	0-9	Fine sandy loam-	SM, ML, CL	A-4	0	100	95-100	70-85	40-55	<33	<5
	9-32	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	100	95-100	80-95	30-50	---	---
	32-60	Silty clay loam, silty clay, clay loam.	CL	A-6, A-7	0	100	100	100	85-100	35-45	15-20

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Elnora:											
En------------------	0-8	Loamy fine sand-	SM	A-2, A-4	0	100	95-100	70-95	25-45	---	NP
	8-13	Loamy fine sand, fine sand.	SM	A-2, A-4	0	100	95-100	70-95	25-45	---	NP
	13-60	Fine sand, loamy fine sand.	SM	A-2, A-4	0	100	90-100	60-85	20-45	---	NP
Farmington:											
FaB-----------------	0-7	Cherty silt loam.	CL-ML, CL, GM-GC	A-4, A-6	0-5	55-80	50-75	45-70	35-65	25-35	5-15
	7-17	Silt loam, cherty loam.	ML, CL, GM, GC	A-2, A-4	0-5	60-95	55-90	50-85	35-80	20-30	2-10
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]FGC:											
Farmington part--	0-7	Cherty silt loam.	CL-ML, CL, GM-GC	A-2, A-4, A-6	0-5	55-80	50-75	45-70	35-65	25-35	5-15
	7-17	Silt loam, cherty loam.	ML, CL, GM, GC	A-2, A-4	0-5	60-95	55-90	50-85	35-80	20-30	2-10
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wassaic part------	0-8	Silt loam--------	ML	A-4	0	80-100	75-100	60-95	55-90	25-35	2-10
	8-29	Loam, gravelly fine sandy loam, silty clay loam.	GM, GC, SM, CL	A-2, A-4	0-5	60-100	55-95	45-95	25-85	15-25	2-10
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
[1]FHF:											
Farmington part--	0-7	Cherty silt loam.	CL-ML, CL, GM, GC	A-4, A-6	0-5	55-80	50-75	45-70	35-65	25-35	5-15
	7-17	Silt loam, cherty loam.	ML, CL, GM, GC	A-2, A-4	0-5	60-95	55-90	50-85	35-80	20-30	3-10
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
Fonda:											
Fo------------------	0-7	Mucky silt loam-	CL, OL, CL-ML	A-6, A-7	0	95-100	95-100	90-100	80-90	23-43	7-18
	7-60	Silty clay, clay, silty clay loam.	CL	A-6	0	95-100	95-100	90-100	80-95	25-40	11-25
Fredon:											
Fr------------------	0-11	Loam-------------	ML, CL, SC, SM	A-4	0-2	80-95	75-95	65-90	45-70	20-30	NP-10
	11-28	Fine sandy loam, loam, sandy loam.	SM, SC, ML, CL	A-1, A-2, A-4	0-2	60-100	50-95	30-85	15-70	20-30	NP-10
	28-60	Very gravelly sandy loam, very gravelly sand.	GP, GM, GW, GW-GM	A-1	0-5	30-55	25-50	10-40	0-15	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Galen:											
GaA, GaB----------	0-11	Very fine sandy loam.	ML	A-4	0	100	95-100	80-95	50-60	5-15	NP-5
	11-24	Fine sandy loam, very fine sandy loam, fine sand.	SM, ML	A-2, A-4	0	100	95-100	70-95	25-65	<15	NP-4
	24-45	Loamy fine sand, loamy very fine sand, fine sand.	SM, ML	A-2, A-4	0	100	95-100	70-95	25-60	<15	NP-4
	45-64	Stratified fine sand to very fine sand.	SM	A-2, A-4	0	100	95-100	60-90	20-50	---	NP
Halsey:											
Ha----------------	0-8	Loam------------	CL-ML, ML, CL, SM-SC	A-4	0-2	85-100	75-100	60-90	45-70	20-30	5-10
	8-26	Loam, gravelly fine sandy loam, very fine sandy loam.	SM-SC, CL, CL-ML	A-2, A-4	0-2	60-100	50-100	35-90	20-70	20-30	5-10
	26-60	Very gravelly loamy sand, stratified sand and gravel.	SP, GP, GM, SM	A-1	5-10	35-60	30-55	20-40	0-20	---	NP
Hamlin:											
Hb----------------	0-11	Silt loam--------	ML, CL, CL-ML,	A-4, A-6	0	100	95-100	90-100	70-90	15-35	2-15
	11-35	Silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	50-90	15-35	2-15
	35-42	Very fine sandy loam, silt loam.	ML, SM, CL, SM-SC	A-4, A-6	0	90-100	90-100	75-100	45-90	<25	NP-15
	42-62	Very gravelly loamy sand, gravelly fine sandy loam.	GW-GM, GM, SW-SM, SM	A-1, A-2, A-4	0-5	30-80	25-75	10-65	5-40	---	NP
Herkimer:											
HeB---------------	0-9	Shaly silt loam-	ML, SM, GM	A-6, A-7	0-10	60-80	55-75	45-70	35-65	35-45	10-15
	9-30	Gravelly loam, fine sandy loam, silt loam.	ML, SM, GM-GC, GM	A-4, A-2	0-10	60-100	55-100	40-90	25-85	25-35	5-10
	30-62	Very shaly loam, shaly silt loam, gravelly loam.	ML, GC, GM-GC, SM-SC, SC	A-4, A-2	5-15	40-70	40-70	35-65	25-55	15-25	5-10
Hilton:											
HlA, HlB----------	0-11	Loam------------	CL, ML	A-4	0-5	85-95	80-90	70-85	50-70	20-30	2-10
	11-26	Gravelly loam, fine sandy loam, sandy clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-2	0-10	65-95	60-90	45-85	20-65	15-25	5-10
	26-58	Gravelly loam, gravelly fine sandy loam, very gravelly loam.	SM, SC, GM, GC	A-4, A-2	5-10	55-80	50-70	40-65	20-60	15-25	2-10
Honeoye:											
HnB, HnC, HnD, HnE	0-9	Silt loam--------	ML, CL-ML	A-4, A-6	0	80-95	75-95	70-90	55-80	25-35	5-12
	9-29	Gravelly loam, silt loam.	ML, CL, GC, SC	A-4, A-6	0-10	65-95	60-95	55-90	40-80	25-35	5-12
	29-62	Gravelly loam, gravelly silt loam, very gravelly fine sandy loam.	GC, CL, CL-ML	A-2, A-1, A-4	5-10	45-75	40-75	30-70	15-60	15-25	5-10

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Honeoye:											
[1]HOE:											
Honeoye part-----	0-9	Silt loam--------	ML, CL-ML	A-4, A-6	0	80-95	75-95	70-90	55-80	25-35	5-10
	9-29	Gravelly loam, silt loam.	ML, CL, GC, SC	A-4, A-6	0-10	65-95	60-95	55-90	40-80	25-35	5-10
	29-62	Gravelly loam, gravelly silt loam, very gravelly fine sandy loam.	GC, CL, CL-ML, SM-SC	A-2, A-1, A-4	5-10	45-75	40-75	30-70	15-60	15-25	5-10
Farmington part--	0-7	Cherty silt loam.	CL-ML, CL, GM-GC	A-4, A-6 A-6	0-5	55-80	50-75	45-70	35-65	25-35	5-15
	7-17	Silt loam, cherty loam. sandy loam.	ML, CL, GM, GC	A-2, A-4 A-6	0-5	60-95	55-90	50-85	35-80	20-30	2-10
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Howard:											
HwA, HwB----------	0-8	Sandy loam------	SM	A-4, A-2	0	90-100	80-90	50-65	25-35	25-35	5-10
	8-24	Gravelly loam, very gravelly sandy loam, gravelly silt loam.	SC, GC, GM-GC, CL-ML	A-4, A-2, A-1	0-5	45-80	40-75	25-70	10-60	15-25	5-10
	24-35	Very gravelly loam, very gravelly sandy clay loam, very gravelly sandy loam.	GC, GP-GC	A-2, A-6	5-10	40-55	35-50	20-45	10-40	30-40	10-20
	35-60	Stratified sand and gravel.	GW, GP, GP-GM	A-1	5-15	35-45	30-40	15-30	0-5	---	NP
HxA, HxB, HxC, HxD	0-8	Gravelly silt loam.	SM, GM, ML, GC	A-4, A-2, A-1	0-5	55-80	50-75	45-70	35-65	25-35	5-10
	8-24	Gravelly loam, very gravelly sandy loam, gravelly silt loam.	SC, GC, GM-GC, CL-ML	A-4, A-2, A-1	0-5	45-80	40-75	25-70	10-60	15-25	5-10
	24-35	Very gravelly loam, very gravelly sandy clay loam, very gravelly sandy loam.	GC, GP-GC	A-2, A-6	5-10	40-55	35-50	20-45	10-40	30-40	10-20
	35-60	Stratified sand and gravel.	GW, GP, GP-GM	A-1	5-15	35-45	30-40	15-30	0-5	---	NP
Lairdsville:											
LaB---------------	0-8	Silt loam--------	ML, CL	A-6, A-7	0	90-100	85-95	70-95	55-90	30-40	10-15
	8-33	Silty clay, clay, shaly clay loam.	CL	A-6	0-5	70-100	60-95	55-95	50-90	25-35	10-15
	33	Weathered bedrock.	---	---	---	---	---	---	---	---	---
LbC, LbD3, LbE3---	0-8	Silty clay loam-	ML, CL	A-6, A-7	0	90-100	85-95	80-95	75-90	30-45	10-15
	8-33	Silty clay, clay, shaly clay loam.	CL	A-6	0-5	70-100	60-95	55-95	50-90	25-35	10-15
	33	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lakemont:											
Lk----------------	0-7	Silt loam--------	OL, CL, ML	A-6, A-7	0	100	95-100	80-100	65-95	35-48	12-20
	7-35	Silty clay, silty clay loam, clay.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	80-100	30-55	10-25
	35-62	Silty clay, clay	CL, CH, MH	A-6, A-7	0	100	95-100	90-100	80-100	30-55	10-25
Lamson:											
Lm----------------	0-9	Very fine sandy loam.	SM, ML	A-4	0	95-100	90-100	70-90	40-55	<20	NP-4
	9-42	Fine sandy loam, very fine sandy loam.	SM, ML	A-4	0	95-100	90-100	65-90	40-55	<20	NP-4
	42-62	Stratified fine sand to silt.	SM, ML	A-2, A-4	0	95-100	90-100	60-90	20-85	---	NP
Lansing:											
LsB, LsC, LsD-----	0-6	Gravelly silt loam.	ML, GM, SM, CL-ML	A-4	0-5	60-75	55-70	45-65	40-60	20-30	2-10
	6-42	Silt loam, loam, gravelly loam.	ML, CL, GC, SM-SC	A-4	0-5	55-95	50-90	45-85	40-80	15-25	2-10
	42-65	Gravelly loam, gravelly silt loam, very gravelly loam.	ML, CL, GC, GM-GC	A-4, A-2	5-10	45-80	40-70	35-65	30-60	15-25	2-10
Lima:											
LtA, LtB, LtC-----	0-8	Silt loam--------	ML, CL	A-4, A-6, A-7	0	80-95	75-90	70-85	55-80	35-45	10-20
	8-23	Loam, gravelly loam, silt loam.	CL, GC, SC	A-6	0-10	60-95	55-90	50-85	40-80	30-40	10-20
	23-60	Gravelly loam, gravelly silt loam, very gravelly fine sandy loam.	GC, CL, CL-ML, SM-SC	A-2, A-1, A-4	5-10	45-80	40-70	35-65	20-60	15-25	5-10
LuC---------------	0-8	Very stony silt loam.	ML, SM, CL, GM	A-4, A-6, A-7	5-10	60-80	55-75	50-70	40-65	35-45	10-20
	8-23	Loam, gravelly loam, silt loam.	CL, GC, SC	A-6	0-10	60-95	55-90	50-85	40-80	30-40	10-20
	23-60	Gravelly loam, gravelly silt loam, very gravelly fine sandy loam.	GC, CL, CL-ML, SM-SC	A-2, A-1, A-4	5-10	45-80	40-70	35-65	20-60	15-25	5-10
Lockport:											
LvA, LvB----------	0-5	Silt loam--------	CL, CL-ML	A-6, A-7	0	90-100	85-95	70-95	55-90	20-43	5-18
	5-24	Clay, silty clay loam, gravelly clay loam.	CL, GC, CL-ML, GM-GC	A-6, A-7	0	60-100	50-95	45-95	40-90	35-55	11-20
	24	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Lordstown:											
LwB, LwC, LwD-----	0-4	Channery silt loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	4-28	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lordstown:											
[1]LXE:											
Lordstown part---	0-4	Channery silt loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	4-28	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Arnot part--------	0-1	Channery silt loam, flaggy silt loam.	ML, GM, SM, CL-ML	A-4	5-20	65-85	60-80	55-80	45-70	<30	NP-5
	1-17	Very channery silt loam, very channery loam.	GM, GM-GC	A-2, A-4, A-1	10-25	50-65	40-60	35-55	30-50	<30	NP-5
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lyons:											
Ly----------------	0-10	Silt loam--------	ML, OL	A-4, A-6	0	90-100	85-100	75-95	55-90	30-40	5-15
	10-34	Silt loam, gravelly loam, clay loam.	CL, GC, CL-ML, SC	A-4, A-6	0-5	60-95	55-90	45-85	40-80	20-35	5-15
	34-62	Gravelly loam, gravelly silt loam, very gravelly fine sandy loam.	CL, GC, SC, CL-ML	A-2, A-4, A-6, A-1	5-10	35-85	30-80	25-75	15-70	20-35	5-15
Mardin:											
MaB, MaC, MaD-----	0-8	Channery silt loam.	GM, ML, CL, GC	A-4	5-10	65-85	60-80	50-70	35-65	25-35	5-10
	8-16	Channery silt loam, channery loam, gravelly loam.	CL, GC, CL-ML, GM	A-4	5-10	60-75	55-70	45-70	35-65	15-25	5-10
	16-42	Channery loam, channery silt loam, very channery loam.	CL, GC, SC, CL-ML	A-2, A-4	10-25	55-75	50-70	40-70	30-65	20-30	5-10
	42-60	Channery loam, channery silt loam, very channery silt loam.	CL, GC, SC, CL-ML	A-2, A-4	10-25	40-75	35-75	30-70	25-65	20-30	5-10
MDC---------------	0-8	Very stony silt loam.	GM, ML, CL, GC	A-4	5-15	65-85	60-80	50-70	35-60	25-35	5-10
	8-16	Channery silt loam, channery loam, gravelly loam.	CL, GC, SC, CL-ML	A-4	5-10	60-75	55-70	45-70	35-65	15-25	5-10
	16-42	Channery loam, channery silt loam, very channery loam.	CL, GC, SC, CL-ML	A-2, A-4	10-25	55-75	50-70	40-70	30-65	20-30	5-10
	42-60	Channery loam, channery silt loam, very channery silt loam.	CL, GC, SC, CL-ML	A-2, A-4	10-25	40-75	35-70	30-70	25-65	20-30	5-10
Martisco:											
Mo----------------	10-0	Hemic material--	PT	A-8	0	---	---	---	---	---	---
	0-84	Marl------------	---	---	0	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Middlebury:											
Mr-----------------	0-9	Silt loam--------	ML	A-4	0	85-100	75-100	70-100	55-85	<20	NP-4
	9-41	Silt loam, loam, fine sandy loam.	ML, SM	A-4, A-2	0	85-100	75-100	50-100	30-85	<20	NP-4
	41-60	Very gravelly fine sandy loam, stratified sand and gravel.	GW-GM, GM, SM	A-1, A-2	0-10	30-65	25-55	15-45	5-30	<15	NP-4
Minoa:											
Mt-----------------	0-11	Very fine sandy loam.	ML, SM	A-4	0	95-100	90-100	80-95	45-65	<20	NP-4
	11-30	Loamy very fine sand, silt loam, fine sandy loam.	ML, SM	A-4	0	95-100	90-100	65-95	40-85	<20	NP-4
	30-57	Loamy very fine sand, loamy fine sand, silt loam.	SM, ML	A-2, A-4	0	95-100	90-100	65-95	25-80	---	NP
Naumburg:											
Na-----------------	0-9	Loamy fine sand-	SM	A-1, A-2, A-4	0	95-100	95-100	50-85	15-45	---	NP
	9-34	Loamy fine sand, fine sand, sand.	SM, SW-SM, SP-SM	A-1, A-2, A-3	0	90-100	90-100	45-85	5-35	---	NP
	34-60	Sand, fine sand, loamy fine sand.	SM, SW-SM, SP-SM	A-1, A-2, A-3	0	90-100	90-100	45-80	5-35	---	NP
Niagara:											
NgA, NgB-----------	0-13	Silt loam--------	ML, OL	A-4	0	95-100	90-100	80-95	65-90	35-45	5-15
	13-36	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	65-95	15-25	2-10
	36-58	Silt loam, fine sand, silty clay loam.	ML, SM	A-4, A-2	0	95-100	95-100	70-100	30-95	<15	NP-4
Odessa:											
Od-----------------	0-8	Silt loam--------	CL, ML, OL	A-6, A-7	0	100	95-100	80-100	65-95	35-50	12-20
	8-37	Silty clay loam, silty clay, clay.	CL, CH, ML	A-7	0	100	95-100	90-100	80-100	40-55	15-30
	37-59	Silty clay, clay, silty clay loam.	CL, CH	A-6, A-7	0	100	95-100	90-100	80-100	30-55	15-30
Ontario Variant:											
OnB, OnC-----------	0-12	Loam-------------	ML, SM	A-4	0-10	80-95	75-95	65-85	45-70	20-30	1-6
	12-38	Gravelly loam, loam, sandy clay loam.	ML, SM, SC, CL	A-4, A-2	0-10	70-90	65-95	55-90	20-70	15-25	3-10
	38-61	Gravelly loam, gravelly fine sandy loam, very gravelly loam.	ML, SM, CL, GC	A-4, A-2, A-1	5-15	45-90	40-85	30-80	15-70	15-25	3-10
Ovid:											
OvA, OvB-----------	0-14	Silt loam--------	ML	A-4, A-7	0	90-100	85-100	75-95	60-90	35-45	5-15
	14-33	Silty clay loam, clay loam, gravelly clay loam.	CL, CL-ML	A-4, A-6	0-5	65-100	65-95	60-95	55-90	25-35	5-15
	33-60	Silty clay loam, clay loam, gravelly clay loam.	CL, GC, CL-ML, SM-SC	A-4, A-6, A-2	0-5	55-90	50-90	40-85	30-80	20-35	5-15

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Palms:											
Pb	0-30	Sapric material	PT	A-8	---	---	---	---	---	---	---
	30-60	Clay loam, loam, silt loam.	CL-ML, CL	A-4, A-6	0	85-100	80-100	70-95	50-80	<30	5-15
Palmyra:											
PgA, PgB, PgC, PgD	0-9	Gravelly loam	ML, SM, GM, GM-GC	A-2, A-4, A-1	0-5	60-80	55-75	50-70	35-55	25-35	5-10
	9-33	Gravelly loam, gravelly sandy clay loam, gravelly fine sandy loam.	SM, SC, GM, GC	A-2, A-4	0-5	60-90	55-70	40-65	25-40	25-35	5-10
	33-60	Very gravelly sand.	GP, GW, GP-GM, SW	A-1	5-10	35-60	30-55	15-40	0-10	<5	NP
PhB	0-9	Gravelly silt loam.	ML, SM, GM, GM-GC	A-4	0-5	60-80	55-75	50-70	40-65	25-35	5-10
	9-33	Gravelly loam, gravelly clay loam, gravelly fine sandy loam.	ML, SM, GC, GM	A-2, A-4	0-5	60-90	55-75	40-75	25-60	25-35	5-10
	33-60	Very gravelly sand.	GP, GW, GW-GM, SW	A-1	5-10	35-60	30-55	15-40	0-10	<5	NP
[1]PKC:											
Palmyra part	0-9	Gravelly loam, gravelly fine sandy loam.	ML, SM, GM, GM-GC	A-2, A-4, A-1	0-5	60-80	55-75	40-70	20-55	25-35	5-10
	9-33	Gravelly loam, gravelly sandy clay loam, gravelly fine sandy loam.	SM, SC, GM, GC	A-2, A-4	0-5	60-90	55-70	40-65	25-40	25-35	5-10
	33-60	Very gravelly sand.	GP, GW, SW, GP-GM	A-1	5-10	35-60	30-55	15-40	0-10	<5	NP
Arkport part	0-10	Fine sandy loam	SM, ML	A-4	0	100	95-100	65-85	40-55	<15	NP-6
	10-20	Very fine sandy loam, loamy very fine sand, loamy fine sand.	SM, ML	A-2, A-4	0	100	95-100	70-95	30-65	<15	NP-4
	20-57	Very fine sand, loamy fine sand, loamy very fine sand.	SM, ML	A-2, A-4	0	100	95-100	65-95	20-60	---	NP
	57-68	Loamy fine sand, fine sand, loamy very fine sand.	SM	A-2, A-4	0	100	95-100	60-95	15-50	---	NP
[1]PKD:											
Palmyra part	0-9	Gravelly loam, gravelly fine sandy loam.	ML, SM, GM, GM-GC	A-2, A-4, A-1	0-5	60-80	55-75	40-70	20-55	25-35	5-10
	9-33	Gravelly loam, gravelly sandy clay loam, gravelly fine sandy loam.	SM, SC, GM, GC	A-2, A-4	0-5	60-90	55-70	40-65	25-40	25-35	5-10
	33-60	Very gravelly sand.	GP, GW, SW, GP-GM	A-1	5-10	35-60	30-55	15-40	0-10	<5	NP

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Palmyra:											
Arkport part------	0-10	Fine sandy loam	SM, ML	A-4	0	100	95-100	65-85	40-55	5-15	1-6
	10-20	Very fine sandy loam, loamy very fine sand, loamy fine sand.	SM, ML	A-2, A-4	0	100	95-100	70-95	30-65	<15	NP-4
	20-57	Very fine sand, loamy fine sand, loamy very fine sand.	SM, ML	A-2, A-4	0	100	95-100	65-95	20-60	---	NP
	57-68	Loamy fine sand, fine sand, loamy very fine sand.	SM	A-2, A-4	0	100	95-100	60-95	15-50	---	NP
[1]PKE:											
Palmyra part------	0-9	Gravelly loam, gravelly fine sandy loam.	ML, SM, GM, GM-GC	A-2, A-4, A-1	0-5	60-80	55-75	40-70	20-55	25-35	5-10
	9-33	Gravelly loam, gravelly sandy clay loam, gravelly fine sandy loam.	SM, SC, GM, GC	A-2, A-4	0-5	60-90	55-70	40-65	25-40	25-35	5-10
	33-60	Very gravelly sand.	GP, GW, SW, GP-GM	A-1	5-10	35-60	30-55	15-40	0-10	<5	NP
Arkport part------	0-10	Fine sandy loam	SM, ML	A-4	0	100	95-100	65-85	40-55	5-15	1-6
	10-20	Very fine sandy loam, loamy very fine sand, loamy fine sand.	SM, ML	A-2, A-4	0	100	95-100	70-95	30-65	<15	NP-4
	20-57	Very fine sand, loamy fine sand, loamy very fine sand.	SM, ML	A-2, A-4	0	100	95-100	65-95	20-60	---	NP
	57-68	Loamy fine sand, fine sand, loamy very fine sand.	SM	A-2, A-4	0	100	95-100	60-95	15-50	---	NP
[1]PME:											
Palmyra part------	0-9	Gravelly loam----	ML, SM, GM, GM-GC	A-2, A-4, A-1	0-5	60-80	55-75	50-70	35-55	25-35	5-10
	9-33	Gravelly loam, gravelly sandy clay loam, gravelly fine sandy loam.	SM, SC, GM, GC	A-2, A-4	0-5	60-90	55-70	40-65	25-40	25-35	5-10
	33-60	Very gravelly sand.	GP, GW, SW, GP-GM	A-1	5-10	35-60	30-55	15-40	0-10	<5	NP
Howard part-------	0-8	Gravelly silt loam.	SM, GM, ML, GC	A-4, A-2, A-1	0-5	55-80	50-75	45-70	35-65	25-35	5-10
	8-24	Gravelly loam, very gravelly sandy loam, gravelly silt loam.	SC, GC, GM-GC, CL-ML	A-4, A-2, A-1	0-5	45-80	40-75	25-70	10-60	15-25	5-10
	24-35	Very gravelly loam, very gravelly sandy clay loam, very gravelly sandy loam.	GC, GP-GC	A-4, A-2, A-6	5-10	40-55	35-50	20-45	10-40	30-40	10-20
	35-60	Stratified sand and gravel.	GW, GP, GP-GM	A-1	5-15	35-45	30-40	15-30	0-5	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Palmyra:											
[1]PMF:											
Palmyra part	0-9	Gravelly loam	ML, SM, GM, GM-GC	A-2, A-4, A-1	0-5	60-80	55-75	50-70	35-55	25-35	5-10
	9-33	Gravelly loam, gravelly sandy clay loam, gravelly fine sandy loam.	SM, SC, GM, GC	A-2, A-4	0-5	60-90	55-70	40-65	25-40	25-35	5-10
	33-60	Very gravelly sand.	GP, GW, SW, GP-GM	A-1	5-10	35-60	30-55	15-40	0-10	<5	NP
Howard part	0-8	Gravelly silt loam.	SM, GM, ML, GC	A-4, A-2, A-1	0-5	55-80	50-75	45-70	35-65	25-35	5-10
	8-24	Gravelly loam, very gravelly sandy loam, gravelly silt loam.	SC, GC, GM-GC, CL-ML	A-4, A-2, A-1	0-5	45-80	40-75	25-70	10-60	15-25	5-10
	24-35	Very gravelly loam, very gravelly sandy clay loam, very gravelly sandy loam.	GC, GP-GC	A-2, A-6	5-10	40-55	35-50	20-45	10-40	30-40	10-20
	35-60	Stratified sand and gravel.	GW, GP, GP-GM	A-1	5-15	35-45	30-40	15-30	0-5	---	NP
Phelps:											
PpA, PpB	0-11	Gravelly silt loam.	ML, SM, GM	A-4	0-5	60-80	55-75	50-70	40-65	30-40	5-10
	11-27	Gravelly loam, gravelly clay loam, silt loam.	CL-ML, SM, GC, SC	A-2, A-4	0-5	60-95	55-90	40-90	25-80	25-35	5-10
	27-60	Stratified sand and gravel, very gravelly loamy sand.	GP, GW, SP-SM, SW	A-1	5-10	35-60	30-55	15-40	0-10	---	NP
Raynham:											
Ra	0-9	Silt loam	ML	A-4	0	100	95-100	90-100	70-90	<20	NP
	9-33	Silt loam, very fine sandy loam.	ML	A-4	0	100	95-100	80-100	50-90	<20	NP
	33-58	Silt loam, silt, very fine sandy loam.	ML	A-4	0	100	95-100	80-100	50-90	<20	NP
Schoharie:											
ScB	0-7	Silt loam	ML, CL	A-6, A-7	0	100	95-100	80-100	65-95	35-50	12-20
	7-25	Silty clay, clay, silty clay loam.	CL	A-6, A-7	0	100	95-100	90-100	80-100	30-45	12-20
	25-60	Silty clay, clay	CL	A-6	0	100	95-100	90-100	80-100	25-40	12-20
SdC, SdD3	0-7	Silty clay loam	ML, CL	A-6, A-7	0	100	95-100	90-100	80-95	35-50	12-20
	7-25	Silty clay, clay, silty clay loam.	CL	A-6, A-7	0	100	95-100	90-100	80-100	30-45	12-20
	25-60	Silty clay, clay	CL	A-6	0	100	95-100	90-100	80-100	25-40	12-20
[1]SEE:											
Schoharie part	0-7	Silty clay loam	ML, CL	A-6, A-7	0	100	95-100	90-100	80-95	35-50	12-20
	7-25	Silty clay, clay, silty clay loam.	CL	A-6, A-7	0	100	95-100	90-100	80-100	30-45	12-20
	25-60	Silty clay, clay	CL	A-6	0	100	95-100	90-100	80-100	25-40	12-20

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Schoharie:											
Cazenovia part---	0-11	Silt loam--------	ML	A-4, A-5, A-6, A-7	0	80-100	75-100	70-95	55-90	35-45	5-15
	11-29	Silty clay loam, clay loam, gravelly clay loam.	CL, CL-ML	A-4, A-6	0-5	65-100	65-95	60-95	55-90	25-35	5-15
	29-52	Gravelly silty clay loam, gravelly loam, silt loam.	CL, SC, CL-ML, GM-GC	A-4, A-6, A-2	0-5	55-90	50-90	40-85	30-80	20-35	5-15
Stockbridge:											
SgB, SgC, SgD------	0-7	Channery silt loam.	ML, GM, SM	A-4	0-5	65-80	60-75	55-75	45-65	25-35	3-8
	7-34	Loam, silt loam, gravelly silt loam.	ML, SM, GM-GC, CL-ML	A-4	0-5	65-95	60-90	60-85	40-75	20-30	3-8
	34-62	Loam, silt loam, gravelly loam.	ML, SM, CL-ML, GM-GC	A-4	0-5	60-95	55-90	50-80	35-75	<30	NP-8
[1]ShB:											
Stockbridge part-	0-7	Gravelly silt loam.	ML, GM-SM	A-4	0-5	65-80	60-75	55-75	45-65	25-35	3-8
	7-34	Loam, silt loam, gravelly silt loam.	ML, SM, CL-ML, GM-GC	A-4	0-5	65-95	60-90	60-85	40-75	20-30	3-8
	34-62	Loam, silt loam, gravelly loam.	ML, SM, CL-ML, GM-GC	A-4	0-5	60-95	55-90	50-80	35-75	<30	NP-8
Howard part------	0-8	Gravelly silt loam.	SM, GM, ML	A-4, A-2, A-1	0-5	55-80	50-75	45-70	35-65	25-35	5-10
	8-24	Gravelly loam, very gravelly sandy loam, gravelly silt loam.	SC, GC, GM-GC, CL-ML	A-4, A-2, A-1	0-5	45-80	40-75	25-70	10-60	15-25	5-10
	24-35	Very gravelly loam, very gravelly sandy clay loam, very gravelly sandy loam.	SM, GM, GP, GC	A-4, A-2, A-1	5-10	40-55	35-50	20-45	10-40	30-40	10-20
	35-60	Stratified sand and gravel.	GW, GP	A-1	5-15	35-45	30-40	15-30	0-5	---	NP
[1]ShC:											
Stockbridge part-	0-7	Gravelly silt loam.	ML, GM, SM	A-4	0-5	65-80	60-75	55-75	45-65	25-35	3-8
	7-34	Loam, silt loam, gravelly silt loam.	ML, SM, CL-ML, GM-GC	A-4	0-5	65-95	60-90	60-85	40-75	20-30	3-8
	34-62	Loam, silt loam, gravelly loam.	ML, SM, CL-ML, GM-GC	A-4	0-5	60-95	55-90	50-80	35-75	<30	NP-8

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Stockbridge:											
Howard part-------	0-8	Gravelly silt loam.	SM, GM, ML	A-4, A-2, A-1	0-5	55-80	50-75	45-70	35-65	25-35	5-10
	8-24	Gravelly loam, very gravelly sandy loam, gravelly silt loam.	SC, GC, GM-GC, CL-ML	A-4, A-2, A-1	0-5	45-80	40-75	25-70	10-60	15-25	5-10
	24-35	Very gravelly loam, very gravelly sandy clay loam, very gravelly sandy loam.	SM, GM, GP, GC	A-4, A-2, A-1	5-10	40-55	35-50	20-45	10-40	30-40	10-20
	35-60	Stratified sand and gravel.	GW, GP	A-1	5-15	35-45	30-40	15-30	0-5	---	NP
[1]ShD:											
Stockbridge part-	0-7	Gravelly silt loam.	ML, GM, SM	A-4	0-5	65-80	60-75	55-75	45-65	25-35	3-8
	7-34	Loam, silt loam, gravelly silt loam.	ML, SM, CL-ML, GM-GC	A-4	0-5	65-95	60-90	60-85	40-75	20-30	3-8
	34-62	Loam, silt loam, gravelly loam.	ML, SM, CL-ML, GM-GC	A-4	0-5	60-95	55-90	50-80	35-75	<30	NP-8
Howard part-------	0-8	Gravelly silt loam.	SM, GM, ML	A-4, A-2, A-1	0-5	55-80	50-75	45-70	35-65	25-35	5-10
	8-24	Gravelly loam, very gravelly sandy loam, gravelly silt loam.	GM-GC, SC, GC, CL-ML	A-4, A-2, A-1	0-5	45-80	40-75	25-70	10-60	15-25	5-10
	24-35	Very gravelly loam, very gravelly sandy clay loam, very gravelly sandy loam.	SM, GM, GP, GC	A-4, A-2, A-1	5-10	40-55	35-50	20-45	10-40	30-40	10-20
	35-60	Stratified sand and gravel.	GW, GP	A-1	5-15	35-45	30-40	15-30	0-5	---	NP
Swanton:											
Sw-----------------	0-9	Fine sandy loam-	SM, ML	A-4	0	100	95-100	70-85	40-55	---	NP
	9-29	Fine sandy loam, sandy loam, very fine sandy loam.	SM, ML	A-4, A-2	0	100	95-100	60-95	30-65	---	NP
	29-43	Silty clay loam, silty clay, clay.	CL	A-6, A-7	0	100	100	90-100	75-95	35-45	15-20
	43-63	Very fine sand, silt.	CL, ML, CL-ML	A-4	0	100	100	75-100	50-95	15-30	2-10
Teel:											
Te-----------------	0-5	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	70-90	15-35	2-15
	5-38	Silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	60-90	15-35	2-15
	38-58	Silt loam, fine sandy loam, gravelly very fine sandy loam.	ML, SM, CL, SM-SC	A-4, A-6	0-5	75-100	70-100	60-100	40-90	<25	NP-15

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Tuller:											
TuB	0-6	Channery silt loam.	ML, GM	A-2, A-4	5-10	55-85	50-80	40-80	30-70	30-40	2-7
	6-18	Channery silt loam, flaggy loam.	GM, SM, CL-ML, ML	A-4	5-20	65-85	60-80	50-80	40-70	20-30	2-7
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Volusia:											
VoA, VoB, VoC	0-8	Channery silt loam.	GM, ML, CL	A-4	5-10	65-85	60-80	50-80	40-65	30-40	5-10
	8-13	Channery silt loam, channery loam, gravelly loam.	SC, CL, CL-ML, GM-GC	A-4	5-10	60-85	55-80	45-80	35-65	15-25	5-10
	13-64	Channery silt loam, channery loam, very channery loam.	GM-GC, CL, GC, CL-ML	A-2, A-4	10-25	55-85	50-80	40-65	30-60	20-30	5-10
Wallkill:											
Wa	0-10	Silt loam	ML, OL	A-4, A-5	0	95-100	90-100	90-100	70-90	40-50	5-10
	10-17	Silt loam, loam	CL, CL-ML	A-4	0	95-100	90-100	75-100	55-90	15-25	5-10
	17-43	Sapric material	PT	A-8	0	---	---	---	---	---	---
	43-60	Marl	---	---	---	---	---	---	---	---	---
Wampsville:											
WeA, WeB, WeC, WeD	0-12	Gravelly silt loam.	ML, GM, CL, SM-SC	A-4, A-2	0-5	55-80	50-70	40-70	30-65	<30	NP-10
	12-36	Gravelly clay loam, gravelly sandy clay loam, gravelly loam.	CL, GC, GM-GC, SC	A-4, A-2, A-6	0-5	55-80	50-70	40-70	30-65	25-40	5-15
	36-45	Very gravelly loam, very gravelly silt loam, gravelly loam.	GM, GM-GC	A-1, A-2, A-4	5-10	50-60	40-55	35-55	25-50	<30	NP-10
	45-72	Very gravelly sand.	GP, GW, GW-GM, GP-GM	A-1	5-10	35-50	30-40	15-30	0-10	---	NP
Wareham:											
Wh	0-6	Loamy fine sand	SM	A-2, A-3	0	90-100	80-100	65-85	15-35	---	NP
	6-20	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-2, A-3	0	90-100	80-100	65-95	5-35	---	NP
	20-58	Loamy coarse sand, sand, loamy sand.	SP-SM, SM	A-2, A-3	0	90-100	80-100	65-95	5-35	---	NP
Warners:											
Wk	0-4	Silt loam	ML, OL	A-7, A-5, A-4, A-6	0	95-100	95-100	90-100	70-95	35-50	5-15
	4-28	Silt loam, loam, silty clay loam.	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	70-95	15-30	2-10
	28-70	Marl	---	---	0	---	---	---	---	---	---
Wassaic:											
WmA, WmB, WmC	0-8	Silt loam	ML	A-4	0	80-100	75-100	60-95	55-90	25-35	2-10
	8-29	Loam, gravelly fine sandy loam, silty clay loam.	GM, GC, SM, CL	A-2, A-4	0-5	60-100	55-95	45-95	25-85	15-25	2-10
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Wayland:											
Wn	0-9	Silt loam	ML, OL	A-7, A-5	0	100	95-100	90-100	70-95	40-50	5-15
	9-38	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	100	95-100	90-100	70-95	25-40	5-15
	38-61	Stratified silt loam to fine sandy loam, gravelly silt loam.	CL, SC, GC, CL-ML	A-4	0	65-100	55-100	65-95	40-90	15-25	5-10
Weaver:											
Wv	0-20	Silt loam	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	75-90	20-35	4-15
	20-44	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	75-100	70-100	55-95	51-90	25-40	6-15
Willette:											
Ww	0-26	Sapric material	PT	---	---	---	---	---	---	---	---
	26-60	Silty clay, silty clay loam.	CL, CH	A-7	0	100	95-100	90-100	85-95	45-60	25-34

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	In/hr	In/in	pH					
Alden:									
Ad	0-7	0.6-2.0	0.16-0.22	6.1-7.3	Low	High	Low	---	---
	7-19	0.2-0.6	0.14-0.20	6.1-7.3	Low	High	Low	---	
	19-60	0.2-0.6	0.08-0.15	6.6-8.4	Low	High	Low	---	
Alluvial land:									
AL	0-60	---	---	---	---	---	---	---	---
Angola:									
An	0-10	0.6-2.0	0.17-0.22	6.1-7.3	Low	High	Low	0.37	3
	10-22	0.06-0.2	0.11-0.19	5.6-7.8	Low	High	Low	0.28	
	22	---	---	---	---	---	---	---	
Appleton:									
AoA, AoB	0-12	0.6-2.0	0.12-0.20	5.6-7.3	Low	High	Low	0.32	3
	12-24	0.06-0.2	0.07-0.18	5.6-7.8	Low	High	Low	0.37	
	24-62	0.06-0.2	0.07-0.17	7.4-8.4	Low	High	Low	0.28	
Arkport:									
ArB, ArC, ArD	0-10	2.0-6.0	0.09-0.17	5.1-6.5	Low	Low	Moderate	0.32	3
	10-20	2.0-6.0	0.06-0.16	5.1-6.5	Low	Low	Moderate	0.28	
	20-57	2.0-6.0	0.06-0.12	5.1-6.5	Low	Low	Moderate	0.28	
	57-68	2.0-6.0	0.02-0.06	5.6-7.8	Low	Low	Moderate	0.28	
Arnot:									
AsB, AsC	0-1	0.6-2.0	0.10-0.15	4.5-6.0	Low	Low	High	0.20	2
	1-17	0.6-2.0	0.08-0.12	4.5-6.0	Low	Low	High	0.17	
	17	---	---	---	---	---	---	---	
[1]ATF:									
Arnot part	0-1	0.6-2.0	0.08-0.12	4.5-6.0	Low	Low	High	0.20	2
	1-17	0.6-2.0	0.08-0.12	4.5-6.0	Low	Low	High	0.17	
	17	---	---	---	---	---	---	---	
Lordstown part	0-4	0.6-2.0	0.11-0.17	4.5-5.5	Low	Low	High	0.20	3
	4-28	0.6-2.0	0.10-0.16	4.5-5.5	Low	Low	High	0.28	
	28	---	---	---	---	---	---	---	
Aurora:									
AuB, AuC, AuD	0-9	0.6-2.0	0.16-0.21	5.6-7.3	Low	Moderate	Low	0.37	3
	9-34	0.06-0.2	0.13-0.20	5.6-7.8	Low	Moderate	Low	0.28	
	34	---	---	---	---	---	---	---	
Bath:									
BaB, BaC, BaD, [1]BCE	0-7	0.6-2.0	0.10-0.20	4.5-6.0	Low	Moderate	Moderate	0.24	3
	7-30	0.6-2.0	0.08-0.18	4.5-6.0	Low	Moderate	Moderate	0.28	
	30-55	0.06-0.2	0.00-0.06	5.1-6.5	Low	Moderate	Moderate	0.28	
Camillus:									
CaB, CaC	0-8	0.6-2.0	0.14-0.21	5.6-7.3	Low	Low	Low	0.43	2
	8-18	0.6-2.0	0.15-0.20	5.6-7.3	Low	Low	Low	0.43	
	18-38	0.6-2.0	0.10-0.16	6.6-7.8	Low	Low	Low	0.43	
	38	---	---	---	---	---	---	---	
Canandaigua:									
Cd	0-8	0.6-2.0	0.20-0.35	5.6-7.3	Low	High	Low	---	---
	8-26	0.2-0.6	0.19-0.20	6.1-7.8	Low	High	Low	---	
	26-62	0.2-0.6	0.19-0.20	6.6-8.4	Low	High	Low	---	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	In/hr	In/in	pH					
Carlisle:									
Ce	0-73	6.0-20	0.35-0.45	5.6-7.3	-----------	High	Low	---	---
Cazenovia:									
CfB, CfC, CfC3, CfD	0-11	0.6-2.0	0.13-0.21	5.6-7.3	Low	Moderate	Low	0.37	3
	11-29	0.2-0.6	0.09-0.16	5.6-7.3	Moderate	Moderate	Low	0.37	
	29-52	0.06-0.2	0.11-0.17	7.4-8.4	Low	Moderate	Low	0.28	
Chenango:									
CgB	0-10	0.6-6.0	0.08-0.15	4.5-5.5	Low	Low	Moderate	0.24	3
	10-34	0.6-6.0	0.05-0.14	4.5-6.0	Low	Low	Moderate	0.17	
	34-60	6.0-20	0.04-0.11	5.1-6.5	Low	Low	Moderate	0.17	
Chippewa:									
Ch	0-14	0.6-2.0	0.14-0.21	5.1-6.5	Low	High	Moderate	0.32	3
	14-42	<0.06	0.01-0.02	5.1-7.3	Low	High	Moderate	0.28	
	42-58	<0.06	0.01-0.02	6.1-8.4	Low	High	Low	0.28	
Collamer:									
CkA, CkB, CkC, CkD	0-7	0.6-2.0	0.14-0.21	5.6-7.3	Low	Moderate	Low	0.49	3
	7-16	0.6-2.0	0.14-0.20	5.6-7.3	Low	Moderate	Low	0.43	
	16-26	0.2-0.6	0.16-0.20	6.1-7.3	Low	Moderate	Low	0.43	
	26-60	0.2-0.6	0.12-0.20	6.6-8.4	Low	Moderate	Low	0.64	
Colonie:									
ClA, ClB	0-7	6.0-20	0.09-0.10	5.1-6.5	Low	Low	Moderate	0.24	4
	7-54	6.0-20	0.06-0.08	5.1-6.5	Low	Low	Moderate	0.24	
	54-63	6.0-20	0.02-0.06	5.6-7.3	Low	Low	Moderate	0.24	
Conesus:									
CoB, CoC	0-8	0.6-2.0	0.15-0.20	5.1-7.3	Low	Moderate	Low	0.32	3
	8-43	0.6-2.0	0.09-0.19	5.1-7.3	Low	Moderate	Low	0.37	
	43-60	0.06-0.2	0.08-0.16	7.4-8.4	Low	Moderate	Low	0.28	
Edwards:									
Ed	0-35	6.0-20	0.35-0.45	5.6-7.8	-----------	High	Low	---	---
	35-60	---	---	7.4-8.4	-----------	High	Low	---	
Elmwood:									
ElA, ElB	0-9	2.0-6.0	0.11-0.25	5.1-6.5	Low	Moderate	Moderate	0.32	3
	9-32	2.0-6.0	0.09-0.18	5.1-6.5	Low	Moderate	Moderate	0.32	
	32-60	<0.06	0.10-0.18	6.1-7.3	Moderate	Moderate	Low	0.43	
Elnora:									
En	0-8	2.0-6.0	0.08-0.16	4.5-6.5	Low	Low	Moderate	0.24	4
	8-13	2.0-20.0	0.06-0.08	4.5-6.5	Low	Low	Moderate	0.24	
	13-60	6.0-20.0	0.03-0.06	5.1-7.3	Low	Low	Moderate	0.24	
Farmington:									
FaB	0-7	0.6-2.0	0.08-0.15	5.1-6.5	Low	Low	Moderate	0.28	2
	7-17	0.6-2.0	0.07-0.18	5.6-7.3	Low	Low	Low	0.28	
	17	---	---	---	-----------	-----------	-----------	---	
[1]FGC:									
Farmington part	0-7	0.6-2.0	0.08-0.15	5.1-6.5	Low	Low	Moderate	0.28	2
	7-17	0.6-2.0	0.07-0.18	5.6-7.3	Low	Low	Low	0.28	
	17	---	---	---	-----------	-----------	-----------	---	
Wassaic part	0-8	0.6-2.0	0.13-0.21	5.6-7.3	Low	Moderate	Low	0.32	3
	8-29	0.6-2.0	0.09-0.19	5.6-7.8	Low	Moderate	Low	0.37	
	29	---	---	---	-----------	-----------	-----------	---	
Rock outcrop part.									

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	In/hr	In/in	pH					
Farmington:									
[1]FHF:									
Farmington part	0-7	0.6-2.0	0.08-0.15	5.1-6.5	Low	Low	Moderate	0.28	2
	7-17	0.6-2.0	0.07-0.18	5.6-7.3	Low	Low	Low	0.28	
	17	---	---	---	---	---	---	---	
Rock outcrop part.									
Fonda:									
Fo	0-7	0.6-2.0	0.14-0.21	6.1-7.3	Low	High	Low	---	---
	7-60	<0.2	0.12-0.17	6.6-7.8	Moderate	High	Low	---	
Fredon:									
Fr	0-11	0.6-2.0	0.12-0.20	5.6-7.3	Low	High	Low	0.24	3
	11-28	0.2-2.0	0.12-0.20	5.6-7.3	Low	High	Low	0.24	
	28-60	2.0-20	0.02-0.06	6.6-7.3	Low	High	Low	0.17	
Galen:									
GaA, GaB	0-11	0.6-2.0	0.09-0.17	5.1-7.3	Low	Moderate	Moderate	0.28	3
	11-24	0.6-2.0	0.08-0.16	5.1-6.5	Low	Moderate	Moderate	0.28	
	24-45	0.6-2.0	0.06-0.16	5.6-7.3	Low	Moderate	Moderate	0.28	
	45-64	2.0-6.0	0.06-0.09	5.6-7.8	Low	Moderate	Moderate	0.17	
Halsey:									
Ha	0-8	0.6-6.0	0.14-0.24	6.1-7.3	Low	High	Low	---	---
	8-26	0.6-6.0	0.12-0.18	6.1-7.3	Low	High	Low	---	
	26-60	6.0-20	0.02-0.07	6.6-8.4	Low	High	Low	---	
Hamlin:									
Hb	0-11	0.6-2.0	0.18-0.21	6.1-7.3	Low	Low	Low	---	---
	11-35	0.6-2.0	0.17-0.19	6.1-7.8	Low	Low	Low	---	
	35-42	0.6-2.0	0.17-0.19	6.6-7.8	Low	Low	Low	---	
	42-62	2.0-20	0.02-0.06	6.6-8.4	Low	Low	Low	---	
Herkimer:									
HeB	0-9	0.6-2.0	0.10-0.16	5.1-7.3	Low	Moderate	Low	0.28	3
	9-30	0.6-2.0	0.09-0.20	5.1-7.3	Low	Moderate	Low	0.24	
	30-62	0.6-2.0	0.09-0.20	6.6-7.8	Low	Moderate	Low	0.24	
Hilton:									
HlA, HlB	0-11	0.6-2.0	0.13-0.20	5.1-6.5	Low	Moderate	Moderate	0.32	3
	11-26	0.6-2.0	0.08-0.14	5.6-7.3	Low	Moderate	Low	0.28	
	26-58	0.06-0.2	0.08-0.14	7.4-8.4	Low	Moderate	Low	0.24	
Honeoye:									
HnB, HnC, HnD, HnE	0-9	0.6-2.0	0.12-0.20	5.6-6.5	Low	Low	Low	0.32	3
	9-29	0.6-2.0	0.08-0.18	5.6-7.3	Low	Low	Low	0.37	
	29-62	0.06-0.2	0.06-0.13	7.4-8.4	Low	Low	Low	0.28	
[1]HOE:									
Honeoye part	0-9	0.6-2.0	0.12-0.20	5.6-6.5	Low	Low	Low	0.32	3
	9-29	0.6-2.0	0.08-0.18	5.6-7.3	Low	Low	Low	0.37	
	29-62	0.06-0.2	0.06-0.13	7.4-8.4	Low	Low	Low	0.28	
Farmington part	0-7	0.6-2.0	0.08-0.15	5.1-6.5	Low	Low	Moderate	0.28	2
	7-17	0.6-2.0	0.07-0.18	5.6-7.3	Low	Low	Moderate	0.28	
	17	---	---	---	---	---	---	---	
Howard:									
HwA, HwB	0-8	0.6-2.0	0.12-0.20	5.6-6.5	Low	Low	Low	0.37	3
	8-24	0.6-6.0	0.06-0.12	5.6-6.5	Low	Low	Low	0.20	
	24-35	0.6-6.0	0.05-0.08	5.6-7.3	Low	Low	Low	0.20	
	35-60	>20.	0.01-0.02	7.4-8.4	Low	Low	Low	0.17	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	In/hr	In/in	pH					
Howard:									
HxA, HxB, HxC, HxD	0-8	0.6-6.0	0.07-0.15	5.6-6.5	Low	Low	Low	0.24	3
	8-24	0.6-6.0	0.06-0.12	5.6-6.5	Low	Low	Low	0.20	
	24-35	0.6-6.0	0.05-0.08	5.6-7.3	Low	Low	Low	0.20	
	35-60	>20.	0.01-0.02	7.4-8.4	Low	Low	Low	0.17	
Lairdsville:									
LaB, LbC, LbD3, LbE3	0-8	0.6-2.0	0.15-0.20	5.6-7.3	Low	High	Low	0.43	3
	8-33	<0.06	0.12-0.17	5.6-7.8	Moderate	High	Low	0.28	
	33	---	---	---	---	---	---	---	
Lakemont:									
Lk	0-7	0.20-0.60	0.17-0.21	6.1-7.3	Moderate	High	Low	---	---
	7-35	<0.06	0.12-0.17	6.1-7.3	Moderate	High	Low	---	
	35-62	<0.06	0.12-0.14	7.4-8.4	Moderate	High	Low	---	
Lamson:									
Lm	0-9	0.6-6.0	0.12-0.16	5.6-7.3	Low	High	Low	---	---
	9-42	0.6-6.0	0.11-0.13	6.5-7.8	Low	High	Low	---	
	42-62	0.6-6.0	0.02-0.04	7.4-8.4	Low	High	Low	---	
Lansing:									
LsB, LsC, LsD	0-6	0.6-2.0	0.10-0.16	5.1-6.5	Low	Low	Moderate	0.28	3
	6-42	0.6-2.0	0.09-0.19	5.1-7.3	Low	Low	Moderate	0.37	
	42-65	0.06-0.2	0.08-0.16	7.4-8.4	Low	Low	Low	0.28	
Lima:									
LtA, LtB, LtC	0-8	0.6-2.0	0.12-0.20	5.6-7.3	Low	Moderate	Low	0.32	3
	8-23	0.6-2.0	0.07-0.18	5.6-7.8	Low	Moderate	Low	0.37	
	23-60	0.06-0.2	0.06-0.13	7.4-8.4	Low	Moderate	Low	0.28	
LuC	0-8	0.6-2.0	0.09-0.16	5.6-7.3	Low	Moderate	Low	0.24	3
	8-23	0.6-2.0	0.07-0.18	5.6-7.8	Low	Moderate	Low	0.37	
	23-60	0.06-0.2	0.06-0.13	7.4-8.4	Low	Moderate	Low	0.28	
Lockport:									
LvA, LvB	0-5	0.6-2.0	0.15-0.20	5.6-7.8	Low	High	Low	0.43	3
	5-24	<0.06	0.12-0.17	5.6-7.8	Moderate	High	Low	0.28	
	24	---	---	---	---	---	---	---	
Lordstown:									
LwB, LwC, LwD	0-4	0.6-2.0	0.11-0.17	4.5-5.5	Low	Low	High	0.20	3
	4-28	0.6-2.0	0.10-0.16	4.5-5.5	Low	Low	High	0.28	
	28	---	---	---	---	---	---	---	
[1]LXE:									
Lordstown part	0-4	0.6-2.0	0.11-0.17	4.5-5.5	Low	Low	High	0.20	3
	4-28	0.6-2.0	0.10-0.16	4.5-5.5	Low	Low	High	0.28	
	28	---	---	---	---	---	---	---	
Arnot part	0-1	0.6-2.0	0.10-0.15	4.5-6.0	Low	Low	High	0.20	2
	1-17	0.6-2.0	0.08-0.12	4.5-6.0	Low	Low	High	0.17	
	17	---	---	---	---	---	---	---	
Lyons:									
Ly	0-10	0.6-2.0	0.15-0.20	5.6-7.3	Low	High	Low	---	---
	10-34	0.2-2.0	0.08-0.18	6.1-7.8	Low	High	Low	---	
	34-62	<0.2	0.06-0.15	7.4-8.4	Low	High	Low	---	
Mardin:									
MaB, MaC, MaD	0-8	0.6-2.0	0.11-0.17	4.5-6.5	Low	Moderate	Moderate	0.24	3
	8-16	0.6-2.0	0.09-0.16	4.5-6.5	Low	Moderate	Moderate	0.28	
	16-42	<0.2	0.01-0.03	4.5-6.5	Low	Moderate	Moderate	0.28	
	42-60	<0.2	0.01-0.03	5.1-8.4	Low	Moderate	Low	0.28	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	In/hr	In/in	pH					
Mardin:									
MDC	0-8	0.6-2.0	0.11-0.17	4.5-6.5	Low	Moderate	Moderate	0.24	3
	8-16	0.6-2.0	0.09-0.16	4.5-6.5	Low	Moderate	Moderate	0.28	
	16-42	<0.2	0.01-0.03	4.5-6.5	Low	Moderate	Moderate	0.28	
	42-60	<0.2	0.01-0.03	5.1-8.4	Low	Moderate	Low	0.28	
Martisco:									
Mo	10-0	0.6-6.0	0.25-0.35	6.1-8.4	Low	High	Low	---	---
	0-84	0.06-0.2	---	7.9-8.4	Low	High	Low	---	
Middlebury:									
Mr	0-9	0.6-2.0	0.14-0.21	5.1-6.0	Low	Moderate	Moderate	---	---
	9-41	0.6-2.0	0.10-0.20	5.6-6.5	Low	Moderate	Low	---	
	41-60	2.0-6.0	0.05-0.08	6.1-7.3	Low	Moderate	Low	---	
Minoa:									
Mt	0-11	0.6-2.0	0.13-0.21	5.1-7.3	Low	Moderate	Moderate	0.32	4
	11-30	0.6-2.0	0.13-0.20	5.1-7.3	Low	Moderate	Moderate	0.37	
	30-57	0.6-6.0	0.08-0.13	5.6-7.8	Low	Moderate	Low	0.28	
Naumburg:									
Na	0-9	2.0-6.0	0.05-0.09	3.6-5.5	Low	High	High	0.17	5
	9-34	6.0-20	0.06-0.08	3.6-5.5	Low	High	High	0.17	
	34-60	6.0-20	0.04-0.06	4.5-6.5	Low	High	High	0.17	
Niagara:									
NgA, NgB	0-13	0.6-2.0	0.17-0.22	5.6-7.3	Low	High	Low	0.49	3
	13-36	0.2-0.6	0.16-0.20	5.6-7.8	Low	High	Low	0.43	
	36-58	0.2-0.6	0.12-0.20	6.6-7.8	Low	High	Low	0.64	
Odessa:									
Od	0-8	0.2-0.6	0.17-0.21	5.6-7.3	Moderate	High	Low	0.49	3
	8-37	<0.2	0.12-0.17	5.6-7.8	Moderate	High	Low	0.28	
	37-59	<0.06	0.12-0.14	7.4-8.4	Moderate	High	Low	0.28	
Ontario Variant:									
OnB, OnC	0-12	0.6-2.0	0.13-0.20	5.1-7.3	Low	Low	Moderate	0.32	3
	12-38	0.6-2.0	0.08-0.14	5.1-7.3	Low	Low	Low	0.28	
	38-61	0.6-2.0	0.08-0.14	7.4-8.4	Low	Low	Low	0.24	
Ovid:									
OvA, OvB	0-14	0.6-2.0	0.13-0.21	5.6-7.3	Low	High	Low	0.37	3
	14-33	0.2-0.6	0.09-0.16	6.5-7.8	Moderate	High	Low	0.37	
	33-60	0.06-0.2	0.11-0.17	7.4-8.4	Low	High	Low	0.28	
Palms:									
Pb	0-30	0.6-6.0	0.35-0.45	5.1-7.3	---	High	Moderate	---	---
	30-60	0.2-2.0	0.05-0.19	6.1-8.4	Low	High	Low	---	
Palmyra:									
PgA, PgB, PgC, PgD, PhB	0-9	0.6-2.0	0.10-0.16	5.6-7.3	Low	Low	Low	0.24	3
	9-33	0.6-2.0	0.07-0.15	6.1-7.8	Low	Low	Low	0.28	
	33-60	>20	0.01-0.02	7.4-7.8	Low	Low	Low	0.17	
[1]PKC:									
Palmyra part	0-9	0.6-2.0	0.10-0.16	5.6-7.3	Low	Low	Low	0.24	3
	9-33	0.6-2.0	0.07-0.15	6.1-7.8	Low	Low	Low	0.28	
	33-60	>20	0.01-0.02	7.4-7.8	Low	Low	Low	0.17	
Arkport part	0-10	2.0-6.0	0.09-0.17	4.5-7.3	Low	Low	Moderate	0.32	3
	10-20	2.0-6.0	0.06-0.16	4.5-7.3	Low	Low	Moderate	0.28	
	20-57	2.0-6.0	0.06-0.12	5.1-7.3	Low	Low	Moderate	0.28	
	57-68	2.0-6.0	0.02-0.06	5.6-7.8	Low	Low	Moderate	0.28	
[1]PKD:									
Palmyra part	0-9	0.6-2.0	0.10-0.16	5.6-7.3	Low	Low	Low	0.24	3
	9-33	0.6-2.0	0.07-0.15	6.1-7.8	Low	Low	Low	0.28	
	33-60	>20	0.01-0.02	7.4-7.8	Low	Low	Low	0.17	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Palmyra:									
Arkport part-----	0-10	2.0-6.0	0.09-0.17	4.5-7.3	Low--------	Low--------	Moderate--	0.32	3
	10-20	2.0-6.0	0.06-0.16	4.5-7.3	Low--------	Low--------	Moderate--	0.28	
	20-57	2.0-6.0	0.06-0.12	5.1-7.3	Low--------	Low--------	Moderate--	0.28	
	57-68	2.0-6.0	0.02-0.06	5.6-7.8	Low--------	Low--------	Moderate--	0.28	
[1]PKE:									
Palmyra part-----	0-9	0.6-2.0	0.10-0.16	5.6-7.3	Low--------	Low--------	Low--------	0.24	3
	9-33	0.6-2.0	0.07-0.15	6.1-7.8	Low--------	Low--------	Low--------	0.28	
	33-60	>20	0.01-0.02	7.4-7.8	Low--------	Low--------	Low--------	0.17	
Arkport part-----	0-10	2.0-6.0	0.09-0.17	4.5-7.3	Low--------	Low--------	Moderate--	0.32	3
	10-20	2.0-6.0	0.06-0.16	4.5-7.3	Low--------	Low--------	Moderate--	0.28	
	20-57	2.0-6.0	0.06-0.12	5.1-7.3	Low--------	Low--------	Moderate--	0.28	
	57-68	2.0-6.0	0.02-0.06	5.6-7.8	Low--------	Low--------	Moderate--	0.28	
[1]PME:									
Palmyra part-----	0-9	0.6-2.0	0.10-0.16	5.6-7.3	Low--------	Low--------	Low--------	0.24	3
	9-33	0.6-2.0	0.07-0.15	6.1-7.8	Low--------	Low--------	Low--------	0.28	
	33-60	>20	0.01-0.02	7.4-7.8	Low--------	Low--------	Low--------	0.17	
Howard part------	0-8	0.6-6.0	0.07-0.15	5.6-7.3	Low--------	Low--------	Low--------	0.24	3
	8-24	0.6-6.0	0.06-0.12	5.6-7.3	Low--------	Low--------	Low--------	0.20	
	24-35	0.6-6.0	0.05-0.08	5.6-7.3	Low--------	Low--------	Low--------	0.20	
	35-60	>20.	0.01-0.02	7.4-8.4	Low--------	Low--------	Low--------	0.17	
[1]PMF:									
Palmyra part-----	0-9	0.6-2.0	0.10-0.16	5.6-7.3	Low--------	Low--------	Low--------	0.24	3
	9-33	0.6-2.0	0.07-0.15	6.1-7.8	Low--------	Low--------	Low--------	0.28	
	33-60	>20	0.01-0.02	7.4-7.8	Low--------	Low--------	Low--------	0.17	
Howard part------	0-8	0.6-6.0	0.07-0.15	5.6-7.3	Low--------	Low--------	Low--------	0.24	3
	8-24	0.6-6.0	0.06-0.12	5.6-7.3	Low--------	Low--------	Low--------	0.20	
	24-35	0.6-6.0	0.05-0.08	5.6-7.3	Low--------	Low--------	Low--------	0.20	
	35-60	>20.	0.01-0.02	7.4-8.4	Low--------	Low--------	Low--------	0.17	
Phelps:									
PpA, PpB----------	0-11	0.6-2.0	0.10-0.16	5.6-7.3	Low--------	Moderate--	Low--------	0.24	3
	11-27	0.6-2.0	0.09-0.18	5.6-7.8	Low--------	Moderate--	Low--------	0.28	
	27-60	2.0-20	0.01-0.02	7.4-8.4	Low--------	Moderate--	Low--------	0.17	
Raynham:									
Ra----------------	0-9	0.6-2.0	0.20-0.25	5.1-6.5	Low--------	High------	Moderate--	0.49	3
	9-33	0.2-2.0	0.18-0.22	5.1-6.5	Low--------	High------	Moderate--	0.49	
	33-58	0.06-0.2	0.18-0.22	5.6-7.8	Low--------	High------	Low--------	0.49	
Schoharie:									
ScB, SdC, SdD3----	0-7	0.2-0.6	0.17-0.21	5.6-7.3	Moderate--	High------	Low--------	0.49	3
	7-25	<0.2	0.12-0.17	5.6-7.8	Moderate--	High------	Low--------	0.28	
	25-60	<0.2	0.12-0.14	7.4-8.4	Moderate--	High------	Low--------	0.28	
[1]SEE:									
Schoharie part---	0-7	0.2-0.6	0.17-0.21	5.6-7.3	Moderate--	High------	Low--------	0.49	3
	7-25	<0.2	0.12-0.17	5.6-7.8	Moderate--	High------	Low--------	0.28	
	25-60	<0.2	0.12-0.14	7.4-8.4	Moderate--	High------	Low--------	0.28	
Cazenovia part---	0-11	0.6-2.0	0.13-0.21	5.6-7.3	Low--------	Moderate--	Low--------	0.37	3
	11-29	0.2-0.6	0.09-0.16	5.6-7.3	Moderate--	Moderate--	Low--------	0.37	
	29-52	0.06-0.2	0.11-0.17	7.4-8.4	Low--------	Moderate--	Low--------	0.28	
Stockbridge:									
SgB, SgC, SgD-----	0-7	0.6-2.0	0.11-0.28	4.5-6.5	Low--------	Moderate--	Moderate--	0.28	3
	7-34	0.6-2.0	0.08-0.24	4.5-6.5	Low--------	Moderate--	Moderate--	0.43	
	34-62	0.06-0.2	0.10-0.14	5.6-7.3	Low--------	Moderate--	Low--------	0.17	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Stockbridge:									
[1]ShB:									
Stockbridge part-	0-7	0.6-2.0	0.11-0.28	4.5-6.5	Low--------	Moderate--	Moderate--	0.28	3
	7-34	0.6-2.0	0.08-0.24	4.5-6.5	Low--------	Moderate--	Moderate--	0.43	
	34-62	0.06-0.2	0.10-0.14	5.6-7.3	Low--------	Moderate--	Low--------	0.17	
Howard part------	0-8	0.6-6.0	0.07-0.15	5.6-6.5	Low--------	Low--------	Low--------	0.24	3
	8-24	0.6-6.0	0.06-0.12	5.6-6.5	Low--------	Low--------	Low--------	0.20	
	24-35	0.6-6.0	0.05-0.08	5.6-7.3	Low--------	Low--------	Low--------	0.20	
	35-60	>20.	0.01-0.02	7.4-8.4	Low--------	Low--------	Low--------	0.17	
[1]ShC:									
Stockbridge part-	0-7	0.6-2.0	0.11-0.28	4.5-6.5	Low--------	Moderate--	Moderate--	0.28	3
	7-34	0.6-2.0	0.08-0.24	4.5-6.5	Low--------	Moderate--	Moderate--	0.43	
	34-62	0.06-0.2	0.10-0.14	5.6-7.3	Low--------	Moderate--	Low--------	0.17	
Howard part------	0-8	0.6-6.0	0.07-0.15	5.6-6.5	Low--------	Low--------	Low--------	0.24	3
	8-24	0.6-6.0	0.06-0.12	5.6-6.5	Low--------	Low--------	Low--------	0.20	
	24-35	0.6-6.0	0.05-0.08	5.6-7.3	Low--------	Low--------	Low--------	0.20	
	35-60	>20.	0.01-0.02	7.4-8.4	Low--------	Low--------	Low--------	0.17	
[1]ShD:									
Stockbridge part-	0-7	0.6-2.0	0.11-0.28	4.5-6.5	Low--------	Moderate--	Moderate--	0.28	3
	7-34	0.6-2.0	0.08-0.24	4.5-6.5	Low--------	Moderate--	Moderate--	0.43	
	34-62	0.06-0.2	0.10-0.14	5.6-7.3	Low--------	Moderate--	Low--------	0.17	
Howard part------	0-8	0.6-6.0	0.07-0.15	5.6-6.5	Low--------	Low--------	Low--------	0.24	3
	8-24	0.6-6.0	0.06-0.12	5.6-6.5	Low--------	Low--------	Low--------	0.20	
	24-35	0.6-6.0	0.05-0.08	5.6-7.3	Low--------	Low--------	Low--------	0.20	
	35-60	>20.	0.01-0.02	7.4-8.4	Low--------	Low--------	Low--------	0.17	
Swanton:									
Sw----------------	0-9	2.0-6.0	0.11-0.25	5.1-6.0	Low--------	High------	Moderate--	0.32	3
	9-29	2.0-6.0	0.09-0.20	5.1-6.0	Low--------	High------	Moderate--	0.32	
	29-43	<0.2	0.09-0.18	5.6-7.3	Moderate--	High------	Low--------	0.49	
	43-63	<0.2	0.10-0.20	6.6-8.4	Moderate--	Moderate--	Low--------	0.37	
Teel:									
Te----------------	0-5	0.6-2.0	0.18-0.21	5.6-7.3	Low--------	Moderate--	Low--------	---	---
	5-38	0.6-2.0	0.17-0.19	5.6-7.8	Low--------	Moderate--	Low--------	---	
	38-58	0.6-2.0	0.12-0.19	7.4-7.8	Low--------	Moderate--	Low--------	---	
Tuller:									
TuB---------------	0-6	0.6-2.0	0.09-0.15	4.5-5.5	Low--------	High------	High------	0.24	2
	6-18	0.06-0.6	0.06-0.10	4.5-6.0	Low--------	High------	Moderate--	0.28	
	18	---	---	---	-----------	-----------	-----------	---	
Volusia:									
VoA, VoB, VoC-----	0-8	0.6-2.0	0.11-0.17	4.5-6.0	Low--------	High------	Moderate--	0.24	3
	8-13	0.6-2.0	0.09-0.16	4.5-6.5	Low--------	High------	Moderate--	0.28	
	13-64	<0.2	0.01-0.02	5.6-7.8	Low--------	High------	Low--------	0.28	
Wallkill:									
Wa----------------	0-10	0.6-2.0	0.16-0.21	5.6-7.3	Low--------	Moderate--	Moderate--	---	---
	10-17	0.6-2.0	0.15-0.20	5.6-7.3	Low--------	Moderate--	Moderate--	---	
	17-43	2.0-20.0	0.19-0.22	5.6-7.3	-----------	High------	Low--------	---	
	43-60	---	---	7.8-8.4	Low--------	High------	Low--------	---	
Wampsville:									
WeA, WeB, WeC, WeD	0-12	0.6-2.0	0.10-0.16	5.1-7.3	Low--------	Low--------	Low--------	0.24	3
	12-36	0.6-2.0	0.07-0.13	5.6-7.8	Moderate--	Low--------	Low--------	0.20	
	36-45	2.0-6.0	0.07-0.11	6.1-8.4	Low--------	Low--------	Low--------	0.20	
	45-72	6.0-20.0	0.02-0.04	6.6-8.4	Low--------	Low--------	Low--------	0.17	
Wareham:									
Wh----------------	0-6	6.0-20	0.03-0.15	4.5-6.0	Low--------	Moderate--	High------	0.17	5
	6-20	6.0-20	0.01-0.13	4.5-6.0	Low--------	Moderate--	High------	0.17	
	20-58	6.0-20	0.01-0.13	4.5-6.0	Low--------	Moderate--	High------	0.17	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Warners:									
Wk----------------	0-4	0.2-2.0	0.17-0.22	6.6-7.8	Low--------	High------	Low--------	---	---
	4-28	0.2-2.0	0.16-0.20	7.4-7.8	Low--------	High------	Low--------	---	
	28-70	---	---	7.9-8.4	Low--------	High------	Low--------	---	
Wassaic:									
WmA, WmB, WmC-----	0-8	0.6-2.0	0.13-0.21	5.6-7.3	Low--------	Moderate--	Low--------	0.32	3
	8-29	0.2-2.0	0.09-0.19	5.6-7.3	Low--------	Moderate--	Low--------	0.37	
	29	---	---	---	----------	----------	----------	---	
Wayland:									
Wn----------------	0-9	0.2-2.0	0.17-0.22	5.6-7.3	Low--------	High------	Low--------	---	---
	9-38	0.06-0.2	0.16-0.20	6.1-7.8	Low--------	High------	Low--------	---	
	38-61	0.06-0.2	0.11-0.19	7.4-8.4	Low--------	High------	Low--------	---	
Weaver:									
Wv----------------	0-20	0.6-2.0	0.15-0.20	6.6-8.4	Low--------	Moderate--	Low--------	---	---
	20-44	0.6-2.0	0.15-0.20	7.4-8.4	Low--------	Moderate--	Low--------	---	
Willette:									
Ww----------------	0-26	6.0-20	0.35-0.45	5.6-7.3	----------	High------	Low--------	---	---
	26-60	0.06-0.2	0.12-0.16	6.6-8.4	High------	High------	Low--------	---	

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 13.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	
					Ft			In		
Alden:										
Ad	D	None	---	---	0-0.5	Perched	Nov-Jun	>60	---	High.
Alluvial land:										
AL	A/B	Frequent	Very brief	Jan-Dec	0-6.0	Apparent	Apr-May	>60	---	---
Angola:										
An	C	None	---	---	0.5-1.5	Perched	Dec-May	20-40	Rippable	High.
Appleton:										
AoA, AoB	C	None	---	---	0.5-1.5	Perched	Dec-May	>60	---	High.
Arkport:										
ArB, ArC, ArD	B	None	---	---	>6.0	---	---	>72	---	Low.
Arnot:										
AsB, AsC	C/D	None	---	---	1.0-1.5	Perched	Mar-Apr	10-20	Hard	Moderate.
[1]ATF:										
Arnot part	C/D	None	---	---	1.0-1.5	Perched	Mar-Apr	10-20	Hard	Moderate.
Lordstown part	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate.
Aurora:										
AuB, AuC, AuD	C	None	---	---	1.5-2.0	Perched	Mar-May	20-40	Rippable	Moderate.
Bath:										
BaB, BaC, BaD, [1]BCE	C	None	---	---	2.0-4.0	Perched	Nov-Mar	>60	---	Moderate.
Camillus:										
CaB, CaC	B	None	---	---	2.0-3.0	Perched	Apr-May	20-40	Rippable	Moderate.
Canandaigua:										
Cd	D	None	---	---	0-1.0	Apparent	Nov-May	>60	---	High.
Carlisle:										
Ce	A/D	Frequent	Long	Nov-May	0-1.0	Apparent	Sep-Jun	>96	---	High.
Cazenovia:										
CfB, CfC, CfC3, CfD	B	None	---	---	2.0-4.0	Perched	Mar-May	>60	---	Moderate.
Chenango:										
CgB	A	Rare	---	---	3.0-6.0	Apparent	Mar-Apr	>96	---	Low.
Chippewa:										
Ch	D	None	---	---	0.0-0.5	Perched	Nov-May	>60	---	High.
Collamer:										
CkA, CkB, CkC, CkD	C	None	---	---	1.5-2.0	Perched	Mar-May	>60	---	High.
Colonie:										
ClA, ClB	A	None	---	---	>6.0	---	---	>96	---	Low.
Conesus:										
CoB, CoC	B	None	---	---	1.5-2.0	Perched	Mar-May	>60	---	Moderate.
Edwards:										
Ed	B/D	Frequent	Long	Nov-May	0-0.5	Apparent	Sep-Jun	>96	---	High.
Elmwood:										
ElA, ElB	C	None	---	---	1.0-3.0	Perched	Nov-May	>60	---	High.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Elnora: En	B	None	---	---	1.5-2.0	Apparent	Feb-May	>60	---	Moderate.
Farmington: FaB	C	None	---	---	>6.0	---	---	10-20	Hard	Moderate.
[1]FGC: Farmington part	C	None	---	---	>6.0	---	---	10-20	Hard	Moderate.
Wassaic part	B	None	---	---	2.0-3.0	Perched	Mar-Apr	20-40	Hard	Moderate.
Rock outcrop part.										
[1]FHF: Farmington part	C	None	---	---	>6.0	---	---	10-20	Hard	Moderate.
Rock outcrop part.										
Fonda: Fo	D	None	---	---	0-0.5	Apparent	Oct-Jun	>60	---	Moderate.
Fredon: Fr	C	None	---	---	0-1.5	Apparent	Nov-Jun	>72	---	High.
Galen: GaA, GaB	B	None	---	---	1.5-2.0	Apparent	Mar-May	>60	---	Moderate.
Halsey: Ha	D	None	---	---	0-0.5	Apparent	Sep-Jun	>72	---	High.
Hamlin: Hb	B	Occasional	Brief	Feb-Apr	3.0-6.0	Apparent	---	>60	---	Moderate.
Herkimer: HeB	B	Rare	---	---	2.0-3.0	Apparent	Feb-Apr	>72	---	Moderate.
Hilton: HlA, HlB	B	None	---	---	1.5-2.0	Perched	Mar-May	>60	---	Moderate.
Honeoye: HnB, HnC, HnD, HnE	B	None	---	---	3.0-6.0	Perched	Mar-May	>60	---	Moderate.
[1]HOE: Honeoye part	B	None	---	---	3.0-6.0	Perched	Mar-May	>60	---	Moderate.
Farmington part	C	None	---	---	>6.0	---	---	10-20	Hard	Moderate.
Howard: HwA, HwB, HxA, HxB, HxC, HxD	A	None	---	---	>6.0	---	---	>96	---	Low.
Lairdsville: LaB, LbC, LbD3, LbE3	D	None	---	---	1.5-3.0	Perched	Mar-May	20-40	Rippable	Moderate.
Lakemont: Lk	D	None	---	---	0-0.5	Apparent	Nov-Jun	>60	---	Moderate.
Lamson: Lm	D	None	---	---	0-0.5	Apparent	Dec-May	>60	---	High.
Lansing: LsB, LsC, LsD	B	None	---	---	3.0-6.0	Perched	Mar-May	>60	---	Moderate.
Lima: LtA, LtB, LtC, LuC	B	None	---	---	1.5-2.0	Perched	Mar-May	>60	---	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	
					Ft			In		
Lockport:										
LvA, LvB	D	None	---	---	0.5-1.5	Perched	Dec-May	20-40	Rippable	Moderate.
Lordstown:										
LwB, LwC, LwD	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate.
[1]LXE:										
Lordstown part	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate.
Arnot part	C/D	None	---	---	1.0-1.5	Perched	Mar-Apr	10-20	Hard	Moderate.
Lyons:										
Ly	D	None	---	---	0-0.5	Perched	Nov-Jun	>60	---	High.
Mardin:										
MaB, MaC, MaD	C	None	---	---	1.5-2.0	Perched	Feb-May	>60	---	Moderate.
MDC	C	None	---	---	1.5-2.0	Perched	Feb-May	>60	---	Moderate.
Martisco:										
Mo	D	Frequent	Long to very long.	Nov-Jun	0-0.5	Apparent	Oct-Jun	>96	---	High.
Middlebury:										
Mr	B	Common	Brief	Dec-May	0.5-2.0	Apparent	Feb-May	>60	---	High.
Minoa:										
Mt	C	None	---	---	0.5-1.5	Apparent	Feb-May	>60	---	High.
Naumburg:										
Na	C	None	---	---	0-1.5	Apparent	Dec-Apr	>60	---	Moderate.
Niagara:										
NgA, NgB	C	None	---	---	0.5-1.5	Apparent	Dec-May	>60	---	High.
Odessa:										
Od	D	None	---	---	0.5-1.5	Perched	Dec-May	>60	---	Moderate.
Ontario Variant:										
OnB, OnC	B	None	---	---	4.0-6.0	Apparent	Mar-Apr	>60	---	Moderate.
Ovid:										
OvA, OvB	C	None	---	---	0.5-2.0	Perched	Jan-May	>60	---	High.
Palms:										
Pb	A/D	Frequent	Long	Nov-May	0-1.0	Apparent	Nov-May	>60	---	High.
Palmyra:										
PgA, PgB, PgC, PgD	B	None	---	---	>6.0	---	---	>96	---	Low.
PhB	B	Rare	---	---	3.0-6.0	Apparent	Mar-Apr	>96	---	Low.
[1]PKC:										
Palmyra part	B	None	---	---	>6.0	---	---	>96	---	Low.
Arkport part	B	None	---	---	>6.0	---	---	>72	---	Low.
[1]PKD:										
Palmyra part	B	None	---	---	>6.0	---	---	>96	---	Low.
Arkport part	B	None	---	---	>6.0	---	---	>72	---	Low.
[1]PKE:										
Palmyra part	B	None	---	---	>6.0	---	---	>96	---	Low.
Arkport part	B	None	---	---	>6.0	---	---	>72	---	Low.
[1]PME:										
Palmyra part	B	None	---	---	>6.0	---	---	>96	---	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Potential frost action
					Ft			In		
Palmyra: Howard part	A	None	---	---	>6.0	---	---	>96	---	Low.
[1]PMF: Palmyra part	B	None	---	---	>6.0	---	---	>96	---	Low.
Howard part	A	None	---	---	>6.0	---	---	>96	---	Low.
Phelps: PpA, PpB	B	None	---	---	1.5-2.0	Apparent	Mar-May	>60	---	High.
Raynham: Ra	C	None	---	---	0.5-1.5	Apparent	Feb-Jun	>60	---	High.
Schoharie: ScB, SdC, SdD3	C	None	---	---	1.5-3.0	Perched	Mar-May	>60	---	Moderate.
[1]SEE: Schoharie part	C	None	---	---	1.5-3.0	Perched	Mar-May	>60	---	Moderate.
Cazenovia part	B	None	---	---	2.0-4.0	Perched	Mar-May	>60	---	Moderate.
Stockbridge: SgB, SgC, SgD	B	None	---	---	3.0-6.0	Perched	Dec-Apr	>60	---	Moderate.
[1]ShB: Stockbridge part	B	None	---	---	3.0-6.0	Perched	Dec-Apr	>60	---	Moderate.
Howard part	A	None	---	---	>6.0	---	---	>96	---	Low.
[1]ShC: Stockbridge part	B	None	---	---	3.0-6.0	Perched	Dec-Apr	>60	---	Moderate.
Howard part	A	None	---	---	>6.0	---	---	>96	---	Low.
[1]ShD: Stockbridge part	B	None	---	---	3.0-6.0	Perched	Dec-Apr	>60	---	Moderate.
Howard part	A	None	---	---	>6.0	---	---	>96	---	Low.
Swanton: Sw	B/D	None	---	---	0-1.5	Apparent	Nov-May	>60	---	High.
Teel: Te	B	Common	Brief	Jan-May	0.5-2.0	Apparent	Jan-May	>60	---	High.
Tuller: TuB	D	None	---	---	0.5-1.0	Perched	Dec-Jun	10-20	Hard	High.
Volusia: VoA, VoB, VoC	C	None	---	---	0.5-1.5	Perched	Dec-May	>60	---	High.
Wallkill: Wa	D	Common	Long	Dec-May	0-0.5	Apparent	Nov-Jun	>60	---	High.
Wampsville: WeA, WeB, WeC, WeD	B	None	---	---	5.0-6.0	Apparent	Mar-Apr	>96	---	Low.
Wareham: Wh	C	None	---	---	0-1.0	Apparent	Dec-Jun	>60	---	Moderate.
Warners: Wk	D	Frequent	Long	Nov-May	0.0-0.5	Apparent	Nov-Jun	>60	---	High.
Wassaic: WmA, WmB, WmC	B	None	---	---	2.0-3.0	Perched	Mar-Apr	20-40	Hard	Moderate.
Wayland: Wn	D	Frequent	Long	Nov-Jun	0.0-0.5	Apparent	Nov-Jun	>60	---	High.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	
					Ft			In		
Weaver:										
Wv	C	Occasional	Brief	Jan-Apr	1.5-2.5	Apparent	Dec-Apr	>60	---	High.
Willette:										
Ww	A/D	Frequent	Long	Nov-May	0-1.0	Apparent	Oct-Jun	>96	---	High.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 14.--ENGINEERING TEST DATA

[Tests were made in cooperation with the Federal Highway Administration, Department of Transportation. Dashes indicate that data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution											Liquid limit	Plasticity index	Moisture density		Linear shrinkage
			>3	Percentage passing sieve							Percentage smaller than--							
	AASHTO	Unified		2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture	
			Pct											Pct		Lb/ft3	Pct	Pct
Arkport fsl:[1] (S72NY-053-006)																		
Ap------ 0 to 9	A-4 (00)	SM	0	100	99	99	98	97	94	42	16	7	4	--	NP	108	14	1.6
B2------ 9 to 24	A-4 (00)	SM	0	100	100	100	100	99	98	42	13	6	3	--	NP	109	13	1.4
A'2----- 24 to 42	A-2-4(00)	SM	0	100	100	100	100	100	99	26	6	3	3	--	NP	106	14	0.0
B'21t--- 42 to 47	A-4 (00)	ML	0	100	100	100	99	99	96	52	24	17	13	--	NP	121	12	0.0
B'22t--- 47 to 57	A-4 (00)	ML	0	100	100	100	100	100	99	73	17	15	12	--	NP	114	13	3.0
Bath cn-sil:[2] (S72NY-053-001)																		
Ap------ 0 to 8	A-4 (02)	ML	2	99	89	83	77	70	63	58	25	10	5	39	5	100	19	4.0
B2------ 8 to 24	A-4 (00)	ML	2	98	91	85	78	70	61	57	27	14	8	25	1	114	14	4.0
B'x----- 26 to 50	A-4 (00)	GM-GC	7	95	81	72	64	57	46	39	20	10	6	20	5	129	10	4.0
Camillus sil:[3] (S72NY-053-011)																		
Ap------ 0 to 8	A-4 (02)	ML	0	100	99	98	92	78	60	52	35	19	10	35	8	101	19	4.8
B21----- 8 to 18	A-4 (01)	ML	0	100	100	100	93	78	65	62	38	19	13	29	4	102	20	4.4
B22----- 18 to 27	A-4 (05)	ML	0	100	100	100	99	95	89	88	55	28	19	31	6	101	20	5.0
C1------ 27 to 40	A-2-4(00)	GM	10	100	81	55	50	28	19	16	12	7	5	33	8	103	17	4.6
Honeoye sil:[4] (S65NY-053-001)																		
Ap------ 0 to 6	A-6 (08)	CL	0	100	99	97	95	93	90	76	50	25	14	35	11	106	18	7.4
B&A----- 6 to 12	A-4 (06)	CL	0	100	96	95	94	92	89	76	50	24	13	31	10	106	19	6.0
B21t---- 12 to 19	A-6 (07)	CL	0	100	97	95	94	92	89	76	53	30	22	30	11	107	18	7.0
B22t---- 19 to 28	A-4 (04)	CL	0	100	90	86	82	79	74	62	40	23	15	28	10	113	15	5.6
C------- 28 to 54	A-4 (02)	CL	0	100	90	85	80	75	68	57	38	19	13	24	8	120	13	6.2
Niagara sil:[5] (S72NY-053-009)																		
Ap------ 0 to 8	A-4 (11)	ML	0	100	100	100	100	99	97	95	62	23	16	39	9	94	22	6.0
A2------ 8 to 13	A-4 (06)	ML	0	100	100	100	99	97	90	88	62	31	21	30	7	106	19	6.0
B2t----- 13 to 26	A-6 (13)	CL	0	100	100	100	100	100	97	96	78	45	31	34	13	107	19	9.6
B3------ 26 to 36	A-4 (04)	CL-ML	0	100	100	100	100	100	100	99	61	22	14	26	5	110	17	5.0
C------- 36 to 50	A-4 (00)	ML	0	100	100	100	100	99	99	98	45	12	7	22	2	109	16	1.6
Wassaic sil:[6] (S72NY-053-010)																		
Ap------ 0 to 9	A-4 (02)	ML	3	100	96	93	90	87	79	57	31	17	10	33	5	101	18	4.6
A2------ 9 to 16	A-4 (00)	SM	3	99	89	84	81	76	67	50	26	13	8	29	4	107	18	4.0
B2t----- 16 to 30	A-4 (00)	SM-SC	5	100	98	97	94	86	75	42	32	21	14	21	4	114	14	3.0

[1]Arkport fine sandy loam: city of Oneida, 100 feet west of Middle Road, 1 mile south of Oneida County line.
[2]Bath channery silt loam: town of Brookfield, 100 feet south of Baldwin Road, 1 mile east of Academy Road.
[3]Camillus silt loam: city of Oneida, 20 feet north of Mount Hope Avenue, 100 yards east of Lincoln Township line.
[4]Honeoye silt loam: town of Stockbridge, 40 feet north of Burleson Road at entrance to gravel pit road.
[5]Niagara silt loam: town of Sullivan, 100 feet east of North Road, 0.5 mile north of New York State Route 31.
[6]Wassaic silt loam: town of Lincoln; 150 feet east of County Route 25, 1 mile south of Clockville.

TABLE 15.--RELATIONSHIPS OF POSITION, PARENT MATERIAL, AND DRAINAGE OF SOILS

Parent Material	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS ON TILL PLAINS					
Deep, moderately fine textured, reddish glacial till with 27 to 35 percent clay in the subsoil.	---	Cazenovia	Cazenovia	Ovid[1]	---	---
Deep, medium textured, reddish and brownish glacial till with 18 to 27 percent clay in the subsoil.	---	Honeoye[2]	Lima[2]	Appleton	Lyons	Lyons
Deep, medium textured and moderately coarse textured, reddish glacial till with 18 to 27 percent clay in the subsoil.	---	Ontario Variant	Hilton	Appleton	Lyons	Lyons
Deep, medium textured, brownish glacial till with 18 to 27 percent clay in the subsoil.	---	Lansing[3]	Conesus[3]	Appleton	Lyons	Lyons
Deep, medium textured, brownish glacial till with less than 18 percent clay in the subsoil.	---	Stockbridge	---	---	---	---
Deep, medium textured, brownish glacial till with a compact fragipan.	---	Bath	Mardin	Volusia	Chippewa	---
Deep, medium textured, brownish glacial till with a silt mantle.	---	---	---	---	---	Alden
Moderately deep, medium textured, brownish glacial till over limestone.	---	Wassaic	Wassaic	---	---	---
Shallow, medium textured, brownish glacial till over limestone.	---	Farmington	---	---	---	---
Moderately deep, medium textured to moderately fine textured, brownish glacial till over shale.	---	---	Aurora	Angola	---	---
Moderately deep, fine textured, reddish glacial till over soft shale.	---	Lairdsville	Lairdsville	Lockport	---	---
Moderately deep, medium textured, glacial till over gray soft shale.	---	Camillus	Camillus	---	---	---
Moderately deep, medium textured, brownish glacial till over sandstone and siltstone.	---	Lordstown	---	---	---	---
Shallow, medium textured, brownish glacial till over sandstone and siltstone.	Arnot	Arnot	Arnot	Tuller	Tuller	---

TABLE 15.--RELATIONSHIPS OF POSITION, PARENT MATERIAL, AND DRAINAGE OF SOILS--Continued

Parent Material	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS ON LACUSTRINE PLAINS AND DELTAS					
Clayey, reddish glaciolacustrine deposits	—	Schoharie	Schoharie	Odessa	Lakemont[4]	Fonda
Silty, brownish glaciolacustrine deposits	—	—	Collamer	Niagara	Canandaigua	Canandaigua
Coarse-silty, brownish glaciolacustrine deposits with a compact fragipan.	—	—	—	Raynham	Raynham	—
Sandy, brownish glaciolacustrine deposits	—	Arkport	Galen	Minoa	Lamson	Lamson
Sandy, brownish or reddish glaciolacustrine deposits with bands or firm nodules in the subsoil.	Colonie	—	Elnora	Naumburg[5]	Wareham	—
Sandy, brownish or reddish glaciolacustrine deposits over clay.	—	—	Elmwood	Swanton	Swanton	—
	SOILS ON OUTWASH PLAINS AND TERRACES					
Stratified sand and gravel: reddish, medium textured to moderately fine textured glaciofluvial material.	—	Wampsville	Phelps	Fredon	Fredon	Halsey
Stratified sand and gravel: reddish or brownish, medium textured glaciofluvial material.	Palmyra	Palmyra	Phelps	Fredon	Fredon	Halsey
Stratified sand and gravel: brownish, medium textured to moderately coarse textured glaciofluvial material.	Howard	Howard	—	—	—	—
	SOILS ON ALLUVIAL FANS					
Gravel and sand: brownish, medium textured fluvial material.	Palmyra	Palmyra	—	—	—	—
Shale and sand: brownish, medium textured fluvial material.	—	Herkimer	Herkimer	—	—	—
Channery fragments and sand, brownish: moderately coarse textured fluvial material.	Chenango	Chenango	—	—	—	—

TABLE 15.--RELATIONSHIPS OF POSITION, PARENT MATERIAL, AND DRAINAGE OF SOILS--Continued

Parent Material	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS ON FLOOD PLAINS					
Medium textured, brownish, mildly alkaline alluvial sediments.	-------------	Hamlin-----	Teel---------	Teel------	Wayland----	Wayland---
Medium textured, brownish, acid alluvial sediments-----	-------------	-----------	Middlebury--	Middlebury	-----------	----------
Medium textured, brownish alluvial sediments over marl.	-------------	-----------	Weaver------	----------	-----------	Warners---
Medium textured, brownish alluvial sediments over organic material.	-------------	-----------	------------	----------	-----------	Wallkill--
	SOILS IN SWAMPS AND BOGS					
Deep organic material more than 51 inches thick--------	-------------	-----------	------------	----------	-----------	Carlisle--
Moderately deep organic material, 16 to 50 inches thick, over loamy mineral soil.	-------------	-----------	------------	----------	-----------	Palms-----
Moderately deep organic material, 16 to 50 inches thick, over clay.	-------------	-----------	------------	----------	-----------	Willette--
Moderately deep organic material, 16 to 51 inches thick, over marl.	-------------	-----------	------------	----------	-----------	Edwards---
Shallow organic material, 8 to 16 inches thick, over marl.	-------------	-----------	------------	----------	-----------	Martisco--

[1]These soils are moderately well drained in some areas.
[2]These soils are moderately deep to carbonates.
[3]These soils are deep to carbonates.
[4]These soils are very poorly drained in some areas.
[5]These soils are poorly drained in some areas.

TABLE 16.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Alden	Fine-loamy, mixed, nonacid, mesic Mollic Haplaquepts
Alluvial land	Fluvaquents And Ochrepts
Angola	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Appleton	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Arkport	Coarse-loamy, mixed, mesic Psammentic Hapludalfs
Arnot	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Aurora	Fine-loamy, mixed, mesic Glossaquic Hapludalfs
Bath	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Camillus	Fine-loamy, mixed, mesic Dystric Eutrochrepts
Canandaigua	Fine-silty, mixed, nonacid, mesic Mollic Haplaquepts
Carlisle	Euic, mesic Typic Medisaprists
Cazenovia	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
Chenango	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Chippewa	Fine-loamy, mixed, mesic Typic Fragiaquepts
Collamer	Fine-silty, mixed, mesic Glossoboric Hapludalfs
Colonie	Mixed, mesic Alfic Udipsamments
Conesus	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
Edwards	Marly, euic, mesic Limnic Medisaprists
Elmwood	Coarse-loamy over clayey, mixed, mesic Aquic Dystric Eutrochrepts
Elnora	Mixed, mesic Aquic Udipsamments
Farmington	Loamy, mixed, mesic Lithic Eutrochrepts
Fonda	Fine, illitic, nonacid, mesic Mollic Haplaquepts
Fredon	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Aeric Haplaquepts
Galen	Coarse-loamy, mixed, mesic Psammentic Hapludalfs
*Halsey	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Mollic Haplaquepts
Hamlin	Coarse-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Herkimer	Coarse-loamy, mixed, mesic Dystric Eutrochrepts
Hilton	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
Honeoye	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
Howard	Loamy-skeletal, mixed, mesic Glossoboric Hapludalfs
Lairdsville	Fine, illitic, mesic Typic Hapludalfs
Lakemont	Fine, illitic, mesic Udollic Ochraqualfs
Lamson	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Lansing	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
Lima	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
Lockport	Fine, illitic, mesic Aeric Ochraqualfs
Lordstown	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Lyons	Fine-loamy, mixed, nonacid, mesic Mollic Haplaquepts
Mardin	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Martisco	Fine-silty, carbonatic, mesic Histic Humaquepts
Middlebury	Coarse-loamy, mixed, mesic Fluvaquentic Eutrochrepts
Minoa	Coarse-loamy, mixed, mesic Aquic Dystric Eutrochrepts
*Naumburg	Sandy, mixed, frigid Aeric Haplaquods
Niagara	Fine-silty, mixed, mesic Aeric Ochraqualfs
Odessa	Fine, illitic, mesic Aeric Ochraqualfs
Ontario Variant	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
Ovid	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Palms	Loamy, mixed, euic, mesic Terric Medisaprists
*Palmyra	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Glossoboric Hapludalfs
Phelps	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Glossaquic Hapludalfs
Raynham	Coarse-silty, mixed, nonacid, mesic Aeric Haplaquepts
Schoharie	Fine, illitic, mesic Typic Hapludalfs
Stockbridge	Coarse-loamy, mixed, mesic Dystric Eutrochrepts
*Swanton	Coarse-loamy over clayey, mixed, nonacid, mesic Aeric Haplaquepts
Teel	Coarse-silty, mixed, mesic Fluvaquentic Eutrochrepts
*Tuller	Loamy-skeletal, mixed, acid, mesic Lithic Haplaquepts
Volusia	Fine-loamy, mixed, mesic Aeric Fragiaquepts
Wallkill	Fine-loamy, mixed, nonacid, mesic Thapto-Histic Fluvaquents
Wampsville	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
Wareham	Mixed, mesic Mollic Psammaquents
Warners	Fine-silty, carbonatic, mesic Fluvaquentic Haplaquolls
Wassaic	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
*Wayland	Fine-silty, mixed, nonacid, mesic Mollic Fluvaquents
Weaver	Fine-loamy, mixed, mesic Fluvaquentic Eutrochrepts
Willette	Clayey, illitic, euic, mesic Terric Medisaprists

TABLE 17.--TEMPERATURE AND PRECIPITATION DATA
[Recorded in the period 1951-72 at Morrisville, New York]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	28.2	8.1	18.2	52	-22	0	2.42	1.65	3.11	7	25.8
February----	30.3	9.5	19.9	52	-21	0	2.92	1.81	3.91	8	26.5
March-------	37.9	18.9	28.5	67	-8	9	2.90	1.82	3.87	8	21.7
April-------	52.8	31.8	42.3	82	13	140	2.87	2.11	3.57	9	3.6
May---------	64.4	40.6	50.0	86	24	560	3.48	2.40	4.47	9	.3
June--------	74.1	50.0	56.2	89	32	850	3.82	2.10	5.21	8	.0
July--------	78.4	54.6	63.2	91	41	914	3.47	1.71	4.89	7	.0
August------	76.5	51.6	60.7	90	36	854	3.79	2.64	4.83	8	.0
Reptember--	70.0	45.3	51.9	89	27	752	2.86	1.57	3.91	7	.0
October-----	59.7	36.2	45.6	81	19	458	2.97	1.37	4.27	7	.8
November----	45.5	27.9	36.7	68	5	56	3.30	2.21	4.29	9	8.3
December----	32.6	15.7	24.1	59	-15	15	3.04	2.17	3.83	9	23.3
Year------	54.2	32.5	41.4	92	-25	4,608	37.84	33.26	42.04	96	110.3

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the survey area (40 °F).

TABLE 18.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-72 at Morrisville, New York]

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 4	May 21	June 3
2 years in 10 later than--	April 29	May 16	May 29
5 years in 10 later than--	April 19	May 7	May 20
First freezing temperature in fall:			
1 year in 10 earlier than--	October 2	September 23	September 9
2 years in 10 earlier than--	October 7	September 29	September 14
5 years in 10 earlier than--	October 18	October 10	September 24

TABLE 19.--GROWING SEASON LENGTH

[Recorded in the period 1951-72 at Morrisville, New York]

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	157	136	103
8 years in 10	166	142	111
5 years in 10	181	156	126
2 years in 10	197	169	141
1 year in 10	205	176	149

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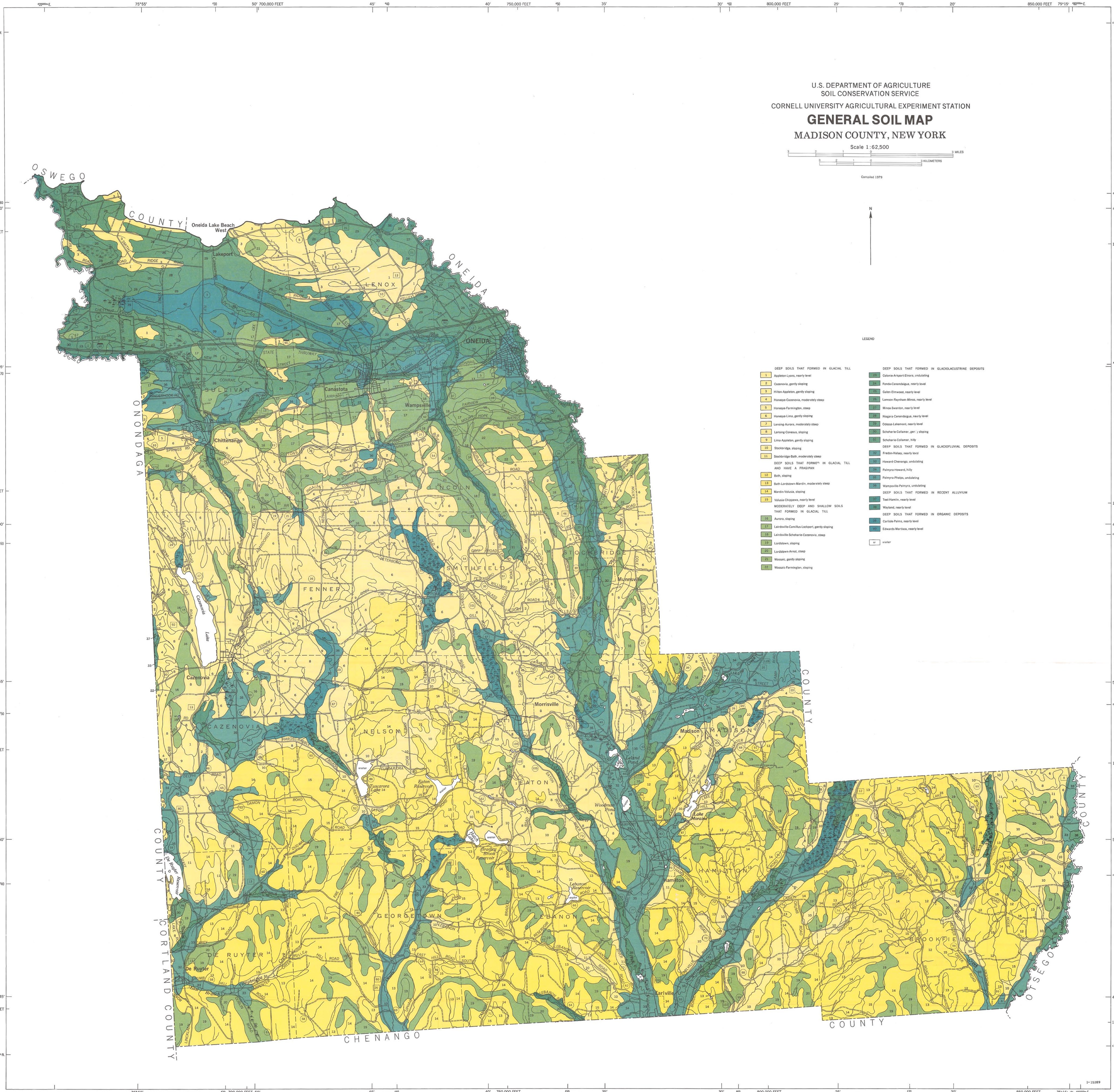

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION
GENERAL SOIL MAP
MADISON COUNTY, NEW YORK
Scale 1:62,500
Compiled 1979
LEGEND
DEEP SOILS THAT FORMED IN GLACIAL TILL
1 Appleton-Lyons, nearly level
2 Cazenovia, gently sloping
3 Hilton-Appleton, gently sloping
4 Honeoye-Cazenovia, moderately steep
5 Honeoye-Farmington, steep
6 Honeoye-Lima, gently sloping
7 Lansing-Aurora, moderately steep
8 Lansing-Conesus, sloping
9 Lima-Appleton, gently sloping
10 Stockbridge, sloping
11 Stockbridge-Bath, moderately steep
DEEP SOILS THAT FORMED IN GLACIAL TILL AND HAVE A FRAGIPAN
12 Bath, sloping
13 Bath-Lordstown-Mardin, moderately steep
14 Mardin-Volusia, sloping
15 Volusia-Chippewa, nearly level
MODERATELY DEEP AND SHALLOW SOILS THAT FORMED IN GLACIAL TILL
16 Aurora, sloping
17 Lairdsville-Camillus-Lockport, gently sloping
18 Lairdsville-Schoharie-Cazenovia, steep
19 Lordstown, sloping
20 Lordstown-Arnot, steep
21 Wassaic, gently sloping
22 Wassaic-Farmington, sloping
DEEP SOILS THAT FORMED IN GLACIOLACUSTRINE DEPOSITS
23 Colonie-Arkport-Elnora, undulating
24 Fonda-Canandaigua, nearly level
25 Galen-Elmwood, nearly level
26 Lamson-Raynham-Minoa, nearly level
27 Minoa-Swanton, nearly level
28 Niagara-Canandaigua, nearly level
29 Odessa-Lakemont, nearly level
30 Schoharie-Collamer, gently sloping
31 Schoharie-Collamer, hilly
DEEP SOILS THAT FORMED IN GLACIOFLUVIAL DEPOSITS
32 Fredon-Halsey, nearly level
33 Howard-Chenango, undulating
34 Palmyra-Howard, hilly
35 Palmyra-Phelps, undulating
36 Wampsville-Palmyra, undulating
DEEP SOILS THAT FORMED IN RECENT ALLUVIUM
37 Teel-Hamlin, nearly level
38 Wayland, nearly level
DEEP SOILS THAT FORMED IN ORGANIC DEPOSITS
39 Carlisle-Palms, nearly level
40 Edwards-Martisco, nearly level
w water
OSWEGO COUNTY
ONEIDA
ONONDAGA
CORTLAND COUNTY
CHENANGO
COUNTY
OTSEGO COUNTY
Oneida Lake Beach West
Lakeport
LENOX
ONEIDA
SULLIVAN
Canastota
Wampsville
Chittenango
FENNER
SMITHFIELD
STOCKBRIDGE
Munnsville
Cazenovia
CAZENOVIA
NELSON
Morrisville
Madison
MADISON
EATON
HAMILTON
Hamilton
GEORGETOWN
LEBANON
DE RUYTER
De Ruyter
Earlville
BROOKFIELD
Leland Pond
Lake Moraine
Tuscarora Lake
Eaton Reservoir
Bradley Brook Reservoir
Lebanon Reservoir
Woodman Pond
De Ruyter Reservoir
Cazenovia Lake
I-15289

Table of interpretations for selected uses--General Soil Map of Madison County, New York

[A rating of slight means that the soils are relatively free of limitations or that the limitations are easily overcome; moderate means that the limitations should be recognized but can be overcome by proper management and careful design; and severe means that the limitations are so serious that feasibility of the specified use is questionable. A rating of severe, however, does not mean that the soil cannot be used for the specified purpose. The terms good, fair, and poor have meanings similar to slight, moderate, and severe, respectively]

Map units and major soils	Percent of map unit 1/	Slope	Topographic setting	Degree and kind of limitation for-- Community development 2/	Recreational development 3/	Farming 4/	Woodland 5/
1. Appleton-Lyons, nearly level: Appleton soils	40	Dominant slope: 0 to 3 percent; range: 0 to 8 percent.	Concave foot slopes and broad flats in the uplands and islandlike areas on the lake plain.	Severe: wetness, frost action.	Moderate: wetness, percs slowly.	Moderate: seasonal wetness.	Fair.
Lyons soils	35	Dominant slope: 0 to 2 percent; range: 0 to 3 percent.	Depressions in the uplands and islandlike areas on the lake plain.	Severe: wetness, frost action.	Severe: wetness	Severe: prolonged wetness.	Poor.
2. Cazenovia, gently sloping: Cazenovia soils	70	Dominant slope: 3 to 8 percent; range: 3 to 15 percent.	Convex knolls and ridges on upland till plains.	Moderate: wetness, frost action.	Moderate: percs slowly	Slight	Good.
3. Hilton-Appleton, gently sloping: Hilton soils	45	Dominant slope: 3 to 8 percent; range: 0 to 8 percent.	Convex ridges and knolls in islandlike areas on the lake plain.	Severe: wetness	Moderate: percs slowly	Slight	Good.
Appleton soils	30	Dominant slope: 0 to 3 percent; range: 0 to 8 percent.	Lower sides of ridges and concave foot slopes between knolls.	Severe: wetness, frost action.	Moderate: wetness, percs slowly.	Moderate: seasonal wetness.	Fair.
4. Honeoye-Cazenovia, moderately steep: Honeoye soils	50	Dominant slope: 15 to 25 percent; range: 15 to 50 percent.	Convex hillsides in the uplands and valley sides.	Severe: slope	Severe: slope	Severe: erosion hazard	Good.
Cazenovia soils	30	Dominant slope: 15 to 25 percent; range: 15 to 50 percent.	Lower parts of valley sides with plane or convex slopes.	Severe: slope	Severe: slope	Severe: erosion hazard	Good.
5. Honeoye-Farmington, steep: Honeoye soils	50	Dominant slope: 25 to 50 percent; range: 25 to 70 percent.	Escarpment fronts along the edge of uplands and valley sides.	Severe: slope	Severe: slope	Severe: erosion hazard	Good.
Farmington soils	25	Dominant slope: 35 to 65 percent; range: 25 to 70 percent.	Escarpment faces along edge of uplands and valley sides.	Severe: slope, depth to rock.	Severe: slope	Severe: erosion hazard	Poor.
6. Honeoye-Lima, gently sloping: Honeoye soils	60	Dominant slope: 3 to 8 percent; range: 3 to 15 percent.	Convex hilltops, hillsides, and undulating plains in uplands.	Moderate: frost action, wetness.	Slight	Slight	Good.
Lima soils	15	Dominant slope: 3 to 8 percent; range: 0 to 15 percent.	Nearly level hilltops, lower parts of hillsides, and foot slopes in uplands.	Severe: wetness	Moderate: percs slowly	Slight	Good.
7. Lansing-Aurora, moderately steep: Lansing soils	50	Dominant slope and range: 15 to 25 percent.	Convex valley sides and elongated hillsides in uplands.	Severe: slope	Severe: slope	Severe: erosion hazard	Good.
Aurora soils	25	Dominant slope and range: 15 to 25 percent.	Hillsides in uplands and lower parts of valley sides.	Severe: slope, depth to rock.	Severe: slope	Severe: erosion hazard	Fair.
8. Lansing-Conesus, sloping: Lansing soils	65	Dominant slope: 8 to 15 percent; range: 3 to 15 percent.	Drumlinlike hills in the uplands	Moderate: slope, frost action, wetness.	Moderate: slope, small stones.	Moderate: erosion hazard.	Good.
Conesus soils	15	Dominant slope: 3 to 8 percent; range: 3 to 15 percent.	Plane and slightly convex lower parts of hillsides and hilltops in the uplands.	Severe: wetness	Moderate: percs slowly	Slight	Good.
9. Lima-Appleton, gently sloping: Lima soils	40	Dominant slope: 3 to 8 percent; range: 0 to 8 percent.	Plane and slightly convex lower parts of hillsides and low rises in the uplands.	Severe: wetness	Moderate: percs slowly	Slight	Good.
Appleton soils	40	Dominant slope: 3 to 8 percent; range: 0 to 8 percent.	Concave foot slopes and narrow flats in the uplands.	Severe: wetness, frost action.	Moderate: wetness, percs slowly.	Moderate: seasonal wetness.	Fair.
10. Stockbridge, sloping: Stockbridge soils	65	Dominant slope: 8 to 15 percent; range: 3 to 15 percent.	Convex hilltops and hillsides in uplands and lower parts of valley sides.	Moderate: slope, frost action.	Moderate: slope, small stones.	Moderate: erosion hazard.	Fair.
11. Stockbridge-Bath, moderately steep: Stockbridge soils	60	Dominant slope and range: 15 to 25 percent.	Slightly convex lower parts of valley sides and hillsides in the uplands.	Severe: slope	Severe: slope	Severe: erosion hazard	Fair.
Bath soils	20	Dominant slope: 15 to 25 percent; range: 15 to 50 percent.	Convex upper parts of valley sides and upland hillsides.	Severe: slope	Severe: slope	Severe: erosion hazard	Fair.
12. Bath, sloping: Bath soils	65	Dominant slope: 8 to 15 percent; range: 3 to 15 percent.	Convex hilltops and upper parts of hillsides in the dissected uplands.	Moderate: slope, wetness.	Moderate: slope, small stones, percs slowly.	Moderate: erosion hazard.	Fair.
13. Bath-Lordstown-Mardin, moderately steep: Bath soils	40	Dominant slope: 15 to 25 percent; range: 15 to 50 percent.	Convex hillsides in the uplands and valley sides.	Severe: slope	Severe: slope	Severe: erosion hazard	Fair.
Lordstown soils	30	Dominant slope and range: 15 to 25 percent.	Valley sides and sides of ridges and hills in the uplands.	Severe: slope, depth to rock.	Severe: slope	Severe: erosion hazard	Fair.
Mardin soils	20	Dominant slope and range: 15 to 25 percent.	Slightly convex and plane slopes of lower parts of valley sides and of upland hillsides.	Severe: slope, wetness.	Severe: slope	Severe: erosion hazard	Fair.
14. Mardin-Volusia, sloping: Mardin soils	55	Dominant slope: 8 to 15 percent; range: 3 to 15 percent.	Broad and slightly convex hilltops, hillsides, and ridges in the uplands.	Severe: wetness	Moderate: percs slowly, small stones, slope.	Moderate: erosion hazard.	Fair.
Volusia soils	25	Dominant slope: 3 to 8 percent; range: 0 to 15 percent.	Concave foot slopes, nearly level hilltops, and plane slopes on hillsides in the uplands.	Severe: wetness, frost action.	Moderate: wetness, percs slowly.	Moderate: seasonal wetness.	Fair.
15. Volusia-Chippewa, nearly level: Volusia soils	40	Dominant slope: 3 to 8 percent; range: 0 to 8 percent.	Concave foot slopes and flats in the uplands.	Severe: wetness, frost action.	Moderate: wetness, percs slowly.	Moderate: seasonal wetness.	Fair.
Chippewa soils	35	Dominant slope and range: 0 to 3 percent.	Slight depressions and low flats along drainageways.	Severe: wetness, frost action.	Severe: wetness	Severe: prolonged wetness.	Poor.
16. Aurora, sloping: Aurora soils	65	Dominant slope: 8 to 15 percent; range: 3 to 15 percent.	Convex, bedrock-controlled hilltops and hillsides in the uplands.	Severe: depth to rock	Moderate: slope, percs slowly.	Moderate: erosion hazard.	Fair.
17. Lairdsville-Camillus-Lockport, gently sloping: Lairdsville soils	50	Dominant slope: 3 to 8 percent; range: 3 to 15 percent.	Broad, convex upland hills and low, islandlike rises on the lake plain.	Severe: low strength	Moderate: percs slowly	Slight	Fair.
Camillus soils	15	Dominant slope: 8 to 15 percent; range: 3 to 15 percent.	Convex hilltops and hillsides mainly in uplands.	Moderate: depth to rock, slope.	Moderate: slope	Moderate: erosion hazard.	Good.
Lockport soils	15	Dominant slope: 0 to 3 percent; range: 0 to 8 percent.	Concave foot slopes and low flats in islandlike areas on the lake plain and in uplands.	Severe: wetness	Severe: wetness, percs slowly.	Moderate: seasonal wetness.	Fair.
18. Lairdsville-Schoharie-Cazenovia, steep: Lairdsville soils	30	Dominant slope: 25 to 40 percent; range: 15 to 40 percent.	Valley sides and escarpmentlike fronts along the edge of the uplands.	Severe: slope, low strength.	Severe: slope	Severe: erosion hazard	Fair.
Schoharie soils	20	Dominant slope: 25 to 50 percent; range: 15 to 50 percent.	Mainly along lower valley sides	Severe: slope, low strength.	Severe: slope	Severe: erosion hazard	Good.
Cazenovia soils	20	Dominant slope: 15 to 25 percent; range: 15 to 50 percent.	Valley sides and escarpmentlike faces at the edge of the uplands.	Severe: slope	Severe: slope	Severe: erosion hazard	Good.
19. Lordstown, sloping: Lordstown soils	65	Dominant slope: 8 to 15 percent; range: 3 to 15 percent.	Convex tops and sides of bedrock-controlled hills.	Severe: depth to rock	Moderate: small stones, slope.	Moderate: erosion hazard.	Fair.
20. Lordstown-Arnot, steep: Lordstown soils	45	Dominant slope: 25 to 60 percent; range: 25 to 70 percent.	Convex and plane slopes on stair-step valley sides.	Severe: slope, depth to rock.	Severe: slope	Severe: erosion hazard	Fair.
Arnot soils	35	Dominant slope: 25 to 60 percent; range: 25 to 70 percent.	Stair-step valley sides	Severe: slope, depth to rock.	Severe: slope	Severe: erosion hazard	Poor.
21. Wassaic, gently sloping: Wassaic soils	65	Dominant slope: 3 to 8 percent; range: 0 to 15 percent.	Convex and stair-step bedrock-controlled slopes.	Severe: depth to rock	Slight	Slight	Fair.
22. Wassaic-Farmington, sloping: Wassaic soils	40	Dominant slope and range: 8 to 15 percent.	Low bedrock-controlled hills and escarpmentlike faces in uplands.	Severe: depth to rock	Moderate: slope	Moderate: erosion hazard.	Fair.
Farmington soils	35	Dominant slope: 8 to 15 percent; range: 3 to 15 percent.	Short slopes of bedrock-controlled escarpment faces and hilltops in the uplands.	Severe: depth to rock	Moderate: slope, small stones.	Moderate: erosion hazard.	Poor.
23. Colonie-Arkport-Elnora, undulating: Colonie soils	50	Dominant slope and range: 0 to 8 percent.	Convex ridges and broad benches on the lake plain.	Slight	Moderate: too sandy	Moderate: droughty	Fair.
Arkport soils	20	Dominant slope: 3 to 8 percent; range: 3 to 15 percent.	Complex slopes on ridges and knolls on the lake plain.	Slight	Slight	Slight	Good.
Elnora soils	20	Dominant slope and range: 0 to 3 percent.	Low benches between ridges and knolls	Severe: wetness	Moderate: too sandy	Moderate: seasonal wetness, droughty.	Fair.
24. Fonda-Canandaigua, nearly level: Fonda soils	40	Dominant slope: 0 to 2 percent; range: 0 to 3 percent.	Nearly level areas and concave depressions on the lake plain.	Severe: wetness, low strength.	Severe: wetness, percs slowly.	Severe: prolonged wetness.	Poor.
Canandaigua soils	30	Dominant slope: 0 to 2 percent; range: 0 to 3 percent.	Low flats and slight depressions on the lake plain.	Severe: wetness, frost action.	Severe: wetness	Severe: prolonged wetness.	Fair.
25. Galen-Elmwood, nearly level: Galen soils	45	Dominant slope: 0 to 3 percent; range: 0 to 8 percent.	Low, slightly convex benches and lower sides of ridges on the lake plain.	Severe: wetness	Slight	Slight	Good.
Elmwood soils	30	Dominant slope: 0 to 3 percent; range: 0 to 8 percent.	Low, convex ridges and benches on the lake plain.	Severe: wetness, frost action.	Moderate: percs slowly	Slight	Fair.
26. Lamson-Raynham-Minoa, nearly level: Lamson soils	30	Dominant slope: 0 to 2 percent; range: 0 to 3 percent.	Slight depressions on the lake plain	Severe: wetness, frost action.	Severe: wetness	Severe: prolonged wetness.	Fair.
Raynham soils	25	Dominant slope and range: 0 to 3 percent.	Low, broad flats on the lake plain	Severe: wetness, frost action.	Severe: wetness	Moderate: seasonal to prolonged wetness.	Fair.
Minoa soils	15	Dominant slope and range: 0 to 3 percent.	Moderately low flats on the lake plain	Severe: wetness, frost action.	Moderate: wetness	Moderate: seasonal wetness.	Fair.
27. Minoa-Swanton, nearly level: Minoa soils	40	Dominant slope and range: 0 to 3 percent.	Moderately low, broad flats on the lake plain.	Severe: wetness, frost action.	Moderate: wetness	Moderate: seasonal wetness.	Fair.
Swanton soils	25	Dominant slope and range: 0 to 3 percent.	Low, nearly level areas on the lake plain.	Severe: wetness, frost action.	Severe: wetness	Moderate: seasonal to prolonged wetness.	Poor.
28. Niagara-Canandaigua, nearly level: Niagara soils	50	Dominant slope: 0 to 3 percent; range: 0 to 8 percent.	Moderately low flats and concave foot slopes on the lake plain.	Severe: wetness, frost action.	Moderate: wetness	Moderate: seasonal wetness.	Fair.
Canandaigua soils	35	Dominant slope: 0 to 2 percent; range: 0 to 3 percent.	Slight depressions on the lake plain	Severe: wetness, frost action.	Severe: wetness	Severe: prolonged wetness.	Fair.
29. Odessa-Lakemont, nearly level: Odessa soils	60	Dominant slope and range: 0 to 3 percent.	Broad, moderately low flats on the lake plain.	Severe: wetness, low strength.	Moderate: wetness, percs slowly.	Moderate: seasonal wetness.	Fair.
Lakemont soils	25	Dominant slope and range: 0 to 3 percent.	Nearly level depressions on the lake plain.	Severe: wetness, low strength.	Severe: wetness, percs slowly.	Severe: prolonged wetness.	Poor.
30. Schoharie-Collamer, gently sloping: Schoharie soils	45	Dominant slope: 3 to 8 percent; range: 3 to 15 percent.	Low, convex knolls, ridges, and benches in valleys and on the lake plain.	Severe: low strength	Moderate: percs slowly	Slight	Good.
Collamer soils	40	Dominant slope: 3 to 8 percent; range: 0 to 15 percent.	Convex knolls and benches along valley floors and on the lake plain.	Severe: wetness, frost action.	Slight	Slight	Good.
31. Schoharie-Collamer, hilly: Schoharie soils	50	Dominant slope: 15 to 25 percent; range: 15 to 50 percent.	Short, convex and complex slopes on hills in valleys and on the lake plain.	Severe: slope, low strength.	Severe: slope	Severe: erosion hazard	Good.
Collamer soils	20	Dominant slope and range: 15 to 25 percent.	Short, complex slopes on hills in valleys and on the lake plain.	Severe: slope, wetness, frost action.	Severe: slope	Severe: erosion hazard	Good.
32. Fredon-Halsey, nearly level: Fredon soils	50	Dominant slope and range: 0 to 3 percent.	Very low benches, foot slopes, and flats on outwash plains in valleys and islandlike areas on the lake plain.	Severe: wetness, frost action.	Moderate: wetness	Moderate: seasonal to prolonged wetness.	Fair.
Halsey soils	20	Dominant slope: 0 to 1 percent; range: 0 to 3 percent.	Depressions and very low flats in valleys and islandlike areas on the lake plain.	Severe: wetness, frost action.	Severe: wetness	Severe: prolonged wetness.	Poor.
33. Howard-Chenango, undulating: Howard soils	60	Dominant slope: 3 to 8 percent; range: 0 to 15 percent.	Benches, terraces, and broad flats along valley floors.	Slight	Moderate: small stones	Slight	Good.
Chenango soils	15	Dominant slope and range: 3 to 8 percent.	Fan-shaped areas spreading onto major valley floors.	Severe: floods (rare)	Moderate: small stones	Slight	Good.
34. Palmyra-Howard, hilly: Palmyra soils	45	Dominant slope: 15 to 25 percent; range: 15 to 45 percent.	Mainly short, complex slopes on hills and ridges along valley floors and on the lower parts of valley sides.	Severe: slope	Severe: slope	Severe: erosion hazard	Good.
Howard soils	25	Dominant slope: 15 to 25 percent; range: 15 to 45 percent.	Short, convex hills and narrow terrace fronts along valley floors.	Severe: slope	Severe: slope	Severe: erosion hazard	Good.
35. Palmyra-Phelps, undulating: Palmyra soils	55	Dominant slope: 3 to 8 percent; range: 0 to 15 percent.	Terraces, broad flats, and fan-shaped areas along valley bottoms.	Slight	Moderate: small stones	Slight	Good.
Phelps soils	20	Dominant slope: 0 to 3 percent; range: 0 to 8 percent.	Moderately low terraces and foot slopes along valley floors.	Severe: wetness, frost action.	Moderate: small stones	Slight	Good.
36. Wampsville-Palmyra, undulating: Wampsville soils	45	Dominant slope: 3 to 8 percent; range: 0 to 15 percent.	Terraces, low hills, and moderately broad plains at the edge of the uplands and in islandlike areas on the lake plain.	Slight	Moderate: small stones	Slight	Good.
Palmyra soils	30	Dominant slope: 3 to 8 percent; range: 0 to 15 percent.	Terraces, benches, and low, convex hills in islandlike areas on the lake plain and at the edge of the uplands.	Slight	Moderate: small stones	Slight	Good.
37. Teel-Hamlin, nearly level: Teel soils	55	Dominant slope and range: 0 to 3 percent.	Nearly level flood plains adjacent to streams.	Severe: floods	Moderate: floods	Slight	Good.
Hamlin soils	20	Dominant slope and range: 0 to 3 percent.	Slightly convex flood plains along streams.	Severe: floods	Moderate: floods	Slight	Good.
38. Wayland, nearly level: Wayland soils	65	Dominant slope: 0 to 1 percent; range: 0 to 3 percent.	Low, nearly level flood plains adjacent to streams.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: prolonged wetness.	Fair.
39. Carlisle-Palms, nearly level: Carlisle soils	40	Dominant slope and range: 0 to 1 percent.	Very low, flat depressions and basins in the uplands, on the lake plain, and in valleys.	Severe: wetness, floods, low strength.	Severe: wetness, floods, excess humus.	Moderate: wetness	Poor.
Palms soils	40	Dominant slope: 0 to 1 percent; range: 0 to 2 percent.	Very low depressions and basins in the uplands, on the lake plain, and in valleys.	Severe: wetness, floods, low strength.	Severe: wetness, floods, excess humus.	Severe: prolonged wetness.	Poor.
40. Edwards-Martisco, nearly level: Edwards soils	35	Dominant slope and range: 0 to 1 percent.	Very low, broad flats and depressions on the lake plain.	Severe: wetness, floods, low strength.	Severe: wetness, floods, excess humus.	Severe: prolonged wetness.	Poor.
Martisco soils	35	Dominant slope and range: 0 to 1 percent.	Low flats and depressions on the lake plain.	Severe: wetness, floods, low strength.	Severe: wetness, floods, excess humus.	Severe: prolonged wetness.	Poor.

1/ The proportional extent of the minor soils are not listed in this table. The minor soils in each map unit are described in the section "General soil map for broad land use planning."

2/ Ratings for "Community development" are for dwellings with basements and for local roads and streets. Use of the soils for sewage disposal, water supply, and establishing and maintaining vegetative cover was not considered in making the ratings.

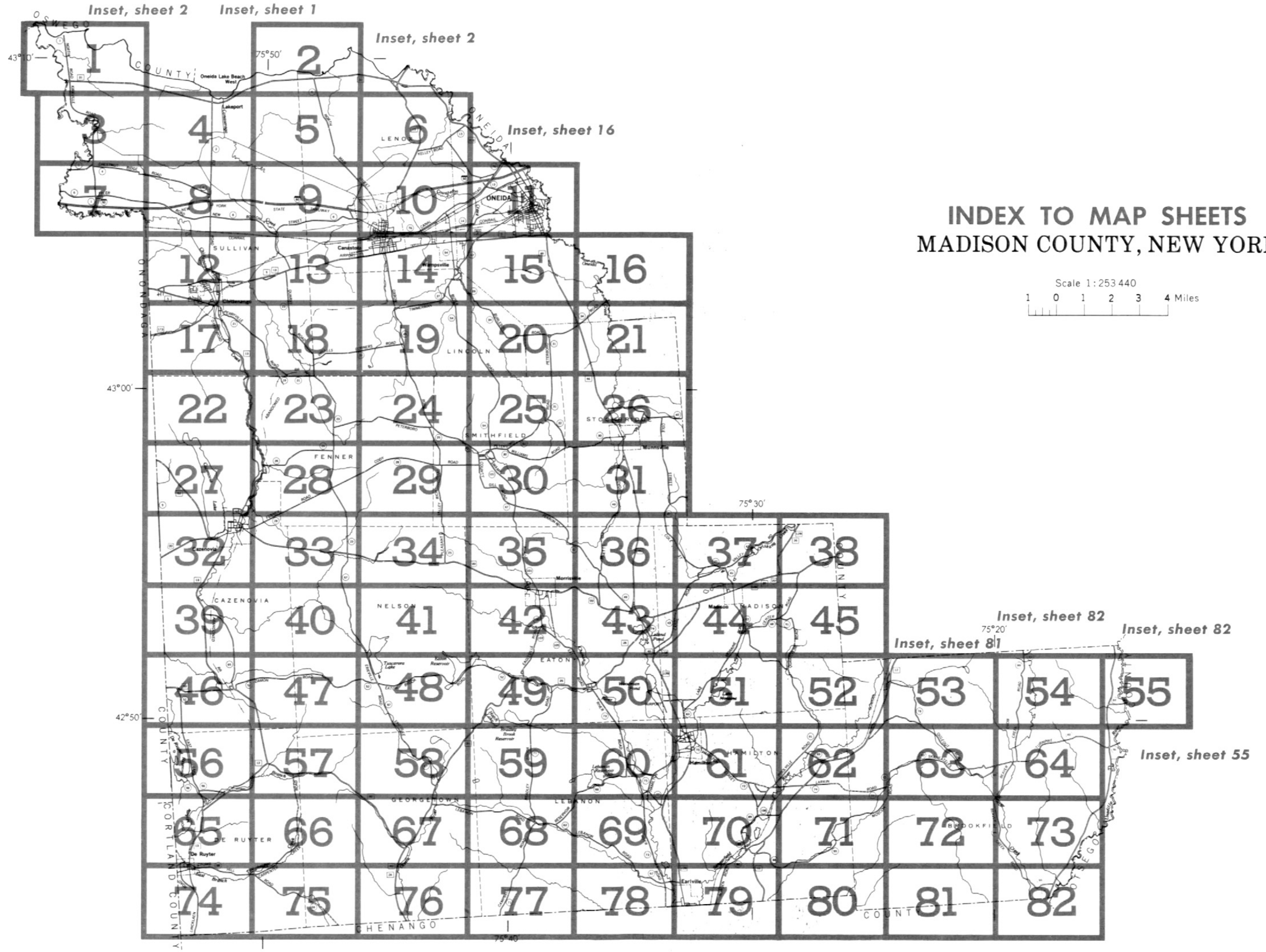
3/ Ratings for "Recreational development" are for picnic areas, camp areas, and paths and trails. Use of the soils for golf fairways and athletic fields was not considered in making the ratings.

4/ Limitations to use of the soils for farming are based on the capability classification system as explained in the text section "Capability classes and subclasses."

5/ Woodland information is given in greater detail in the section "Woodland management and productivity." Soils in woodland suitability groups 1 and 2 are rated good, those in groups 3 and 4 are rated fair, and those in groups 5 and 6 are rated poor.

INDEX TO MAP SHEETS
MADISON COUNTY, NEW YORK

Scale 1:253 440



MADISON COUNTY, NEW YORK

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool — Davis Airstrip; FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate — 79
- Federal — 410
- State — 52
- County, farm or ranch — 378

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small — water; w

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — GAS
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water; w
- Intermittent — int; i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — CeA; FoB2

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Made land — M. L.
- Cut and fill land — C. F. L.
- Borrow Pit — B. P.
- Gravel pit — G. P.
- Quarry — QU.

SOIL LEGEND

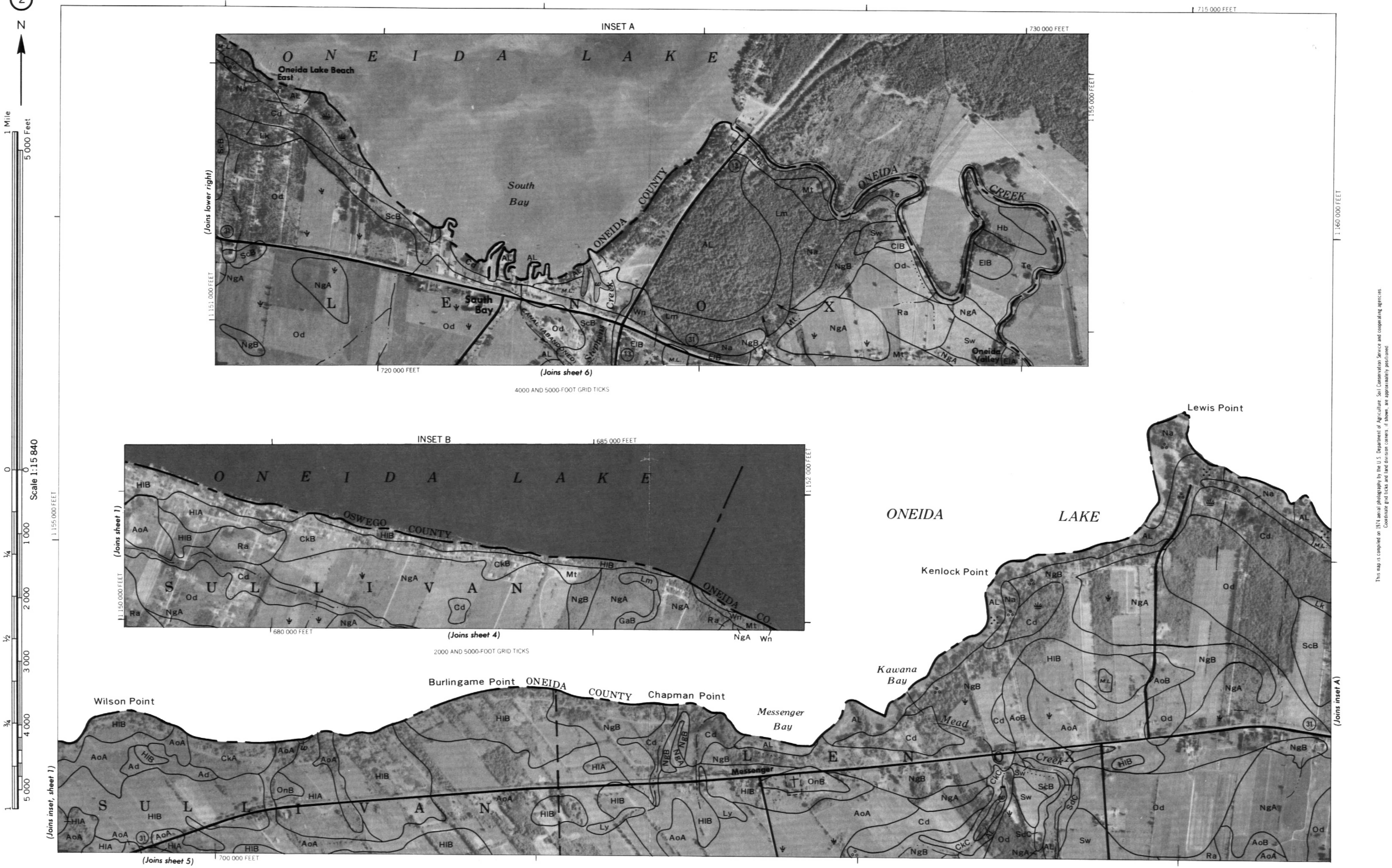
The first letter, always a capital, is the initial letter of the soil name. The second letter is a capital letter if the unit is broadly defined; otherwise, it is a small letter. The third letter, A, B, C, D, E, or F, shows the slope. Most symbols without a slope letter are for nearly level soils. A final number, 3, in the symbol shows that the soil is severely eroded.

SYMBOL	NAME
Ad	Alden mucky silt loam
AL	Alluvial land 1/
An	Angola silt loam
AoA	Appleton loam, 0 to 3 percent slopes
AoB	Appleton loam, 3 to 8 percent slopes
ArB	Arkport fine sandy loam, undulating
ArC	Arkport fine sandy loam, rolling
ArD	Arkport fine sandy loam, hilly
AsB	Arnot channery silt loam, 3 to 8 percent slopes
AsC	Arnot channery silt loam, 8 to 15 percent slopes
ATF	Arnot-Lordstown complex, very steep 1/
AuB	Aurora silt loam, 3 to 8 percent slopes
AuC	Aurora silt loam, 8 to 15 percent slopes
AuD	Aurora silt loam, 15 to 25 percent slopes
BaB	Bath channery silt loam, 3 to 8 percent slopes
BaC	Bath channery silt loam, 8 to 15 percent slopes
BaD	Bath channery silt loam, 15 to 25 percent slopes
BCE	Bath soils, steep 1/
CaB	Camillus silt loam, 3 to 8 percent slopes
CaC	Camillus silt loam, 8 to 15 percent slopes
Cd	Canandaigua silt loam
Ce	Carlisle muck
CfB	Cazenovia silt loam, 3 to 8 percent slopes
CfC	Cazenovia silt loam, 8 to 15 percent slopes
CfC3	Cazenovia silt loam, 8 to 15 percent slopes, severely eroded
CfD	Cazenovia silt loam, 15 to 25 percent slopes
CgB	Chenango channery silt loam, fan, 3 to 8 percent slopes
Ch	Chippewa silt loam
CkA	Collamer silt loam, 0 to 3 percent slopes
CkB	Collamer silt loam, 3 to 8 percent slopes
CkC	Collamer silt loam, rolling
CkD	Collamer silt loam, hilly
ClA	Colonie loamy fine sand, 0 to 3 percent slopes
ClB	Colonie loamy fine sand, undulating
CoB	Conesus silt loam, 3 to 8 percent slopes
CoC	Conesus silt loam, 8 to 15 percent slopes
Ed	Edwards muck
ElA	Elmwood fine sandy loam, 0 to 3 percent slopes
ElB	Elmwood fine sandy loam, 3 to 8 percent slopes
En	Elnora loamy fine sand
FaB	Farmington cherty silt loam, 3 to 8 percent slopes
FGC	Farmington-Wassaic-Rock outcrop complex, sloping 1/
FHF	Farmington-Rock outcrop complex, steep 1/
Fo	Fonda mucky silt loam
Fr	Fredon silt loam
GaA	Galen very fine sandy loam, 0 to 3 percent slopes
GaB	Galen very fine sandy loam, 3 to 8 percent slopes
Ha	Halsey silt loam
Hb	Hamlin silt loam
HeB	Herkimer shaly silt loam, 3 to 8 percent slopes
HlA	Hilton loam, 0 to 3 percent slopes
HlB	Hilton loam, 3 to 8 percent slopes
HnB	Honeoye silt loam, 3 to 8 percent slopes
HnC	Honeoye silt loam, 8 to 15 percent slopes
HnD	Honeoye silt loam, 15 to 25 percent slopes
HnE	Honeoye silt loam, 25 to 50 percent slopes
HOE	Honeoye-Farmington complex, steep 1/
HwA	Howard fine sandy loam, 0 to 3 percent slopes
HwB	Howard fine sandy loam, undulating
HxA	Howard gravelly silt loam, 0 to 3 percent slopes
HxB	Howard gravelly silt loam, undulating
HxC	Howard gravelly silt loam, rolling
HxD	Howard gravelly silt loam, hilly
LaB	Lairdsville silt loam, 3 to 8 percent slopes
LbC	Lairdsville silty clay loam, 8 to 15 percent slopes
LbD3	Lairdsville silty clay loam, 15 to 25 percent slopes, severely eroded
LbE3	Lairdsville silty clay loam, 25 to 40 percent slopes, severely eroded
Lk	Lakemont silt loam
Lm	Lamson very fine sandy loam
LsB	Lansing gravelly silt loam, 3 to 8 percent slopes
LsC	Lansing gravelly silt loam, 8 to 15 percent slopes
LsD	Lansing gravelly silt loam, 15 to 25 percent slopes
LtA	Lima silt loam, 0 to 3 percent slopes
LtB	Lima silt loam, 3 to 8 percent slopes
LtC	Lima silt loam, 8 to 15 percent slopes
LuC	Lima very stony silt loam, sloping
LvA	Lockport silt loam, 0 to 3 percent slopes
LvB	Lockport silt loam, 3 to 8 percent slopes
LwB	Lordstown channery silt loam, 3 to 8 percent slopes
LwC	Lordstown channery silt loam, 8 to 15 percent slopes
LwD	Lordstown channery silt loam, 15 to 25 percent slopes
LXE	Lordstown-Arnot complex, steep 1/
Ly	Lyons silt loam
MaB	Mardin channery silt loam, 3 to 8 percent slopes
MaC	Mardin channery silt loam, 8 to 15 percent slopes
MaD	Mardin channery silt loam, 15 to 25 percent slopes
MDC	Mardin very stony silt loam, sloping 1/
Mo	Martisco muck
Mr	Middlebury silt loam
Mt	Minoa very fine sandy loam
Na	Naumburg loamy fine sand
NgA	Niagara silt loam, 0 to 3 percent slopes
NgB	Niagara silt loam, 3 to 8 percent slopes
Od	Odessa silt loam
OnB	Ontario Variant loam, 3 to 8 percent slopes
OnC	Ontario Variant loam, 8 to 15 percent slopes
OvA	Ovid silt loam, 0 to 3 percent slopes
OvB	Ovid silt loam, 3 to 8 percent slopes
Pb	Palms muck
PgA	Palmyra gravelly loam, 0 to 3 percent slopes
PgB	Palmyra gravelly loam, undulating
PgC	Palmyra gravelly loam, rolling
PgD	Palmyra gravelly loam, hilly
PhB	Palmyra gravelly silt loam, fan, 3 to 8 percent slopes
PKC	Palmyra-Arkport complex, rolling 1/
PKD	Palmyra-Arkport complex, hilly 1/
PKE	Palmyra-Arkport complex, steep 1/
PME	Palmyra and Howard soils, steep 1/
PMF	Palmyra and Howard soils, very steep 1/
PoA	Phelps gravelly silt loam, 0 to 3 percent slopes
PpB	Phelps gravelly silt loam, 3 to 8 percent slopes
Ra	Raynham silt loam
ScB	Schoharie silt loam, 3 to 8 percent slopes
SdC	Schoharie silty clay loam, rolling
SdD3	Schoharie silty clay loam, hilly, severely eroded
SEE	Schoharie-Cazenovia complex, steep 1/
SgB	Stockbridge channery silt loam, 3 to 8 percent slopes
SgC	Stockbridge channery silt loam, 8 to 15 percent slopes
SgD	Stockbridge channery silt loam, 15 to 25 percent slopes
ShB	Stockbridge-Howard gravelly silt loams, 3 to 8 percent slopes
ShC	Stockbridge-Howard gravelly silt loams, 8 to 15 percent slopes
ShD	Stockbridge-Howard gravelly silt loams, 15 to 25 percent slopes
Sw	Swanton fine sandy loam
Te	Teel silt loam
TuB	Tuller channery silt loam, 0 to 8 percent slopes
VoA	Volusia channery silt loam, 0 to 3 percent slopes
VoB	Volusia channery silt loam, 3 to 8 percent slopes
VoC	Volusia channery silt loam, 8 to 15 percent slopes
Wa	Wallkill silt loam
WeA	Wampsville gravelly silt loam, nearly level
WeB	Wampsville gravelly silt loam, undulating
WeC	Wampsville gravelly silt loam, rolling
WeD	Wampsville gravelly silt loam, hilly
Wh	Wareham loamy fine sand
Wk	Warners mucky silt loam
WmA	Wassaic silt loam, 0 to 3 percent slopes
WmB	Wassaic silt loam, 3 to 8 percent slopes
WmC	Wassaic silt loam, 8 to 15 percent slopes
Wn	Wayland silt loam
Wv	Weaver silt loam
Ww	Willette muck

1/ The composition of these units is more variable than others in the survey area, but has been controlled well enough to be interpreted for the expected uses of the soils.



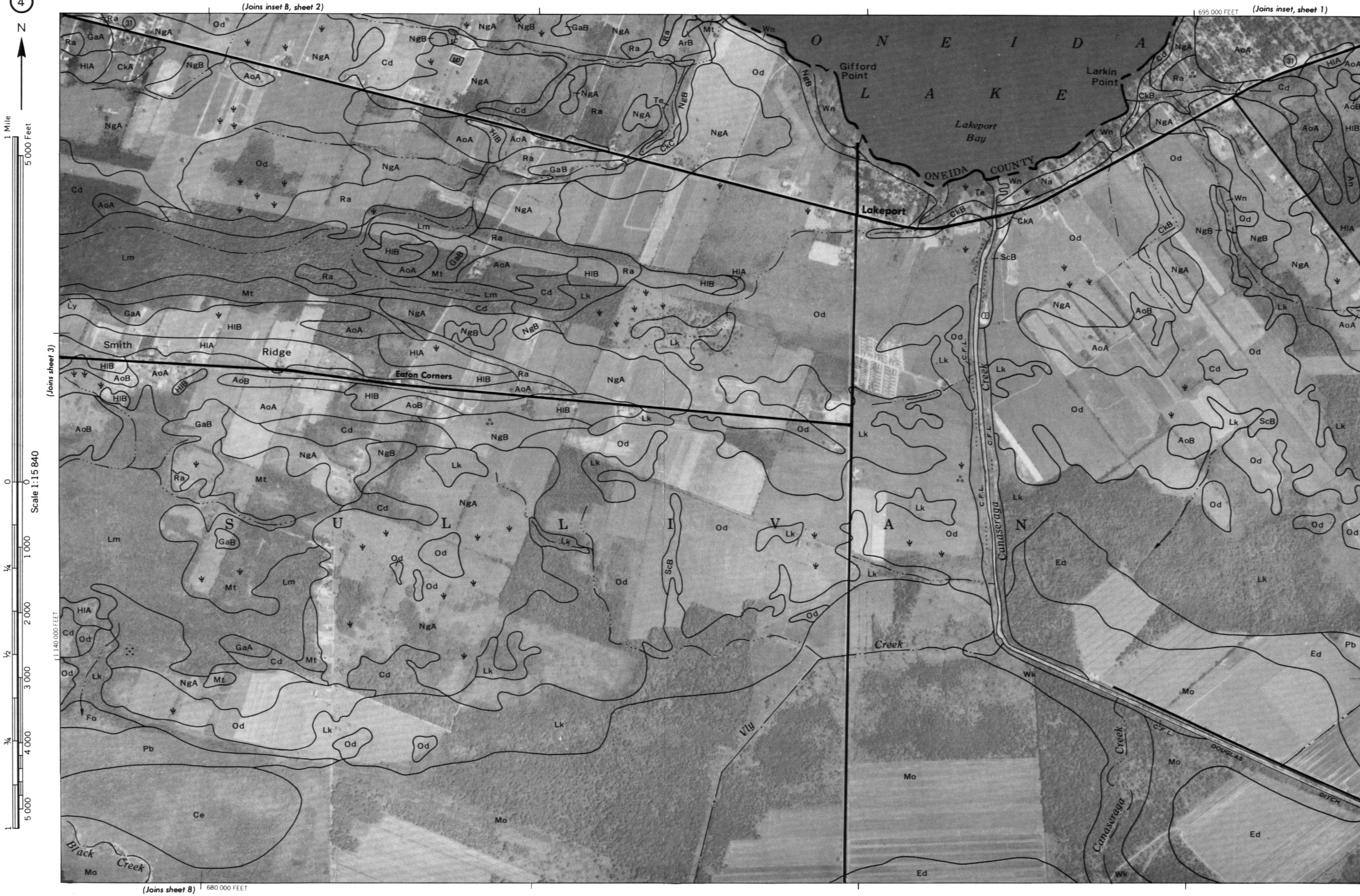
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2
N
1 Mile
5 000 Feet
Scale 1:15 840
INSET A
ONEIDA LAKE
Oneida Lake Beach East
South Bay
ONEIDA COUNTY
ONEIDA CREEK
LENOX
Stephens Creek
Oneida Valley
(Joins lower right)
(Joins sheet 6)
4000 AND 5000-FOOT GRID TICKS
720 000 FEET
730 000 FEET
1 155 000 FEET
1 160 000 FEET
1 151 000 FEET
INSET B
ONEIDA LAKE
OSWEGO COUNTY
ONEIDA CO.
SULLIVAN
(Joins sheet 1)
(Joins sheet 4)
2000 AND 5000-FOOT GRID TICKS
680 000 FEET
685 000 FEET
1 152 000 FEET
1 150 000 FEET
1 155 000 FEET
ONEIDA LAKE
Lewis Point
Kenlock Point
Kawana Bay
Messenger Bay
Wilson Point
Burlingame Point
ONEIDA COUNTY
Chapman Point
Messenger
Mead Creek
SULLIVAN
LENOX
(Joins inset, sheet 1)
(Joins sheet 5)
(Joins inset A)
700 000 FEET
715 000 FEET



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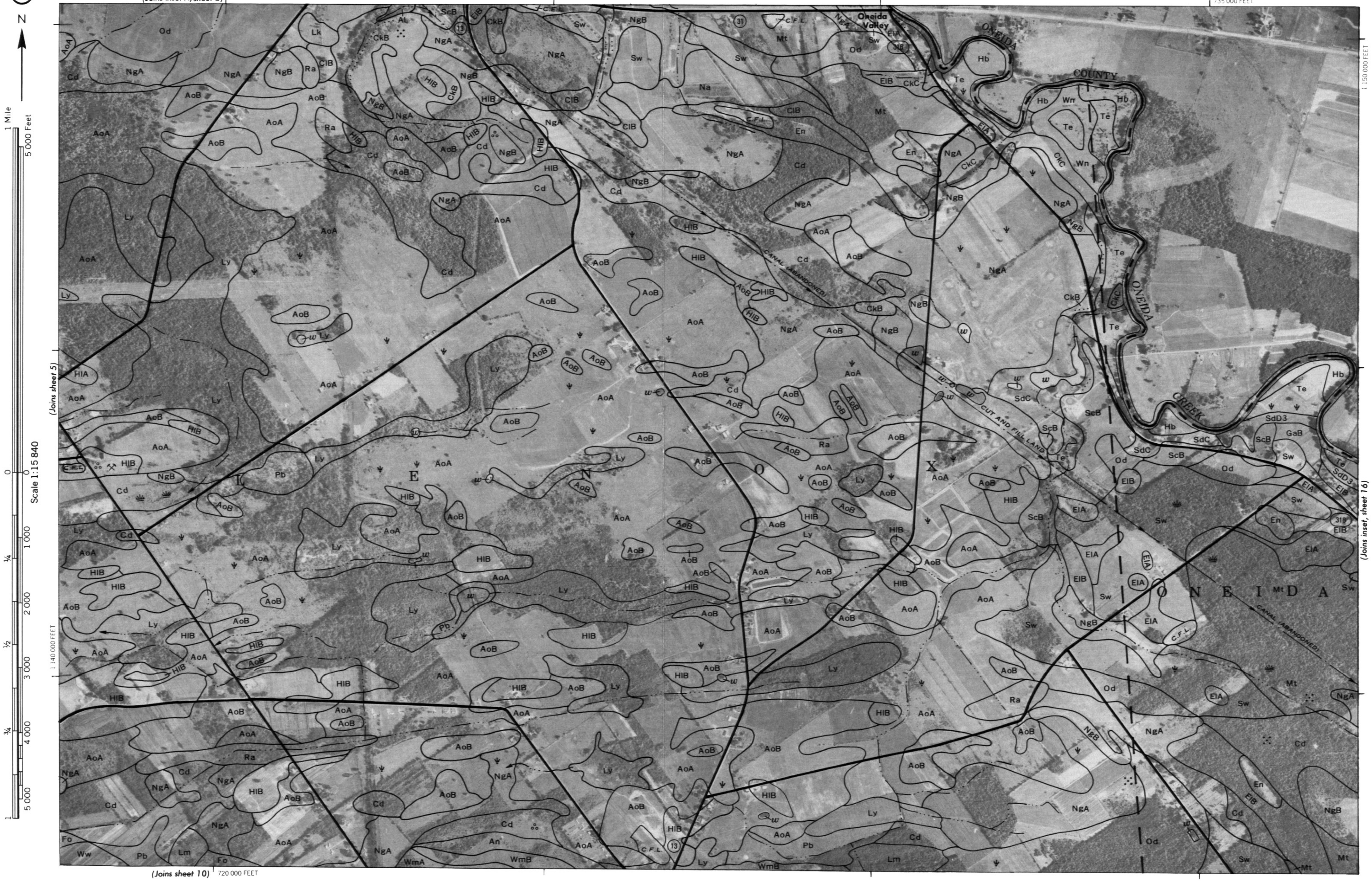


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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MADISON COUNTY, NEW YORK — SHEET NUMBER 6



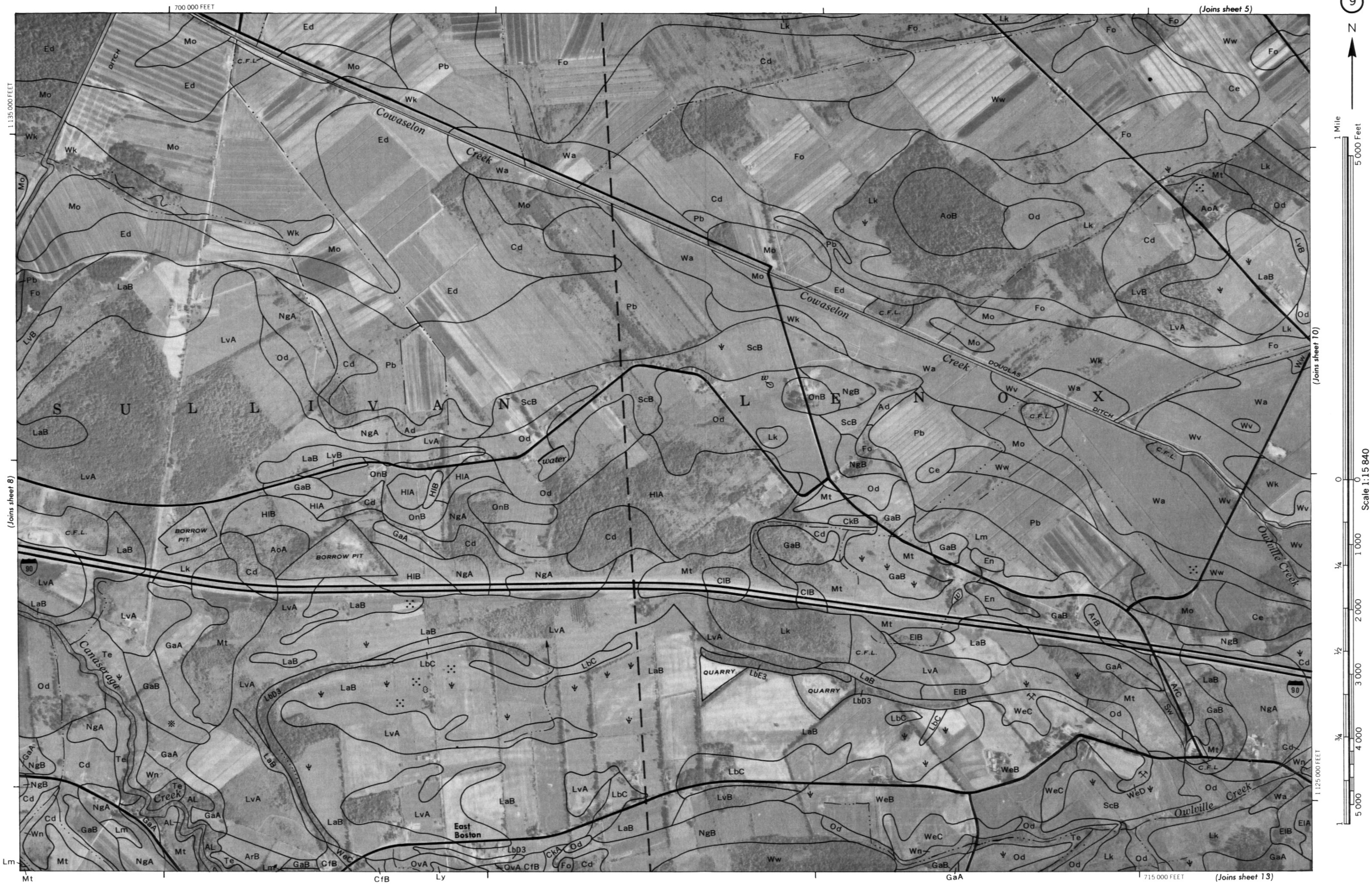
This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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MADISON COUNTY, NEW YORK — SHEET NUMBER 10



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14
N
(Joins sheet 10)
(Joins sheet 13)
(Joins sheet 15)
(Joins sheet 19)
CANASTOTA
WAMPSVILLE
(county seat)
Lenox
ONEIDA
LENOX
LINCOLN
Canastota Creek
Cowaselon Creek
Clockville Creek
Limestone Creek
Wn Creek
CUT AND FILL LAND
OLD ERIE CANAL ABANDONED
CONRAIL
CEMETERY
735 000 FEET
1 120 000 FEET
1 155 000 FEET
720 000 FEET
Scale 1:15 840
1 Mile
5 000 Feet
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1
This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned


15
N
(Joins sheet 11)
(Joins sheet 14)
(Joins sheet 16)
(Joins sheet 20)
740 000 FEET
755 000 FEET
1 120 000 FEET
1 115 000 FEET
Five Corners
Cowaselon Creek
Oneida Creek
ONEIDA COUNTY
O N E I D A
L I N C O L N
CONRAIL
CUT AND FILL LAND
C.F.L.
MADE LAND
GRAVEL PIT
CEMETERY
G.P.
water
1 Mile
5 000 Feet
Scale 1:15 840
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MADISON COUNTY, NEW YORK — SHEET NUMBER 16

N

Scale 1:15 840

1 Mile — 5 000 Feet



INSET



775 000 FEET

1 020 000 FEET

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N

Scale 1:15 840

1 Mile · 5 000 Feet

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



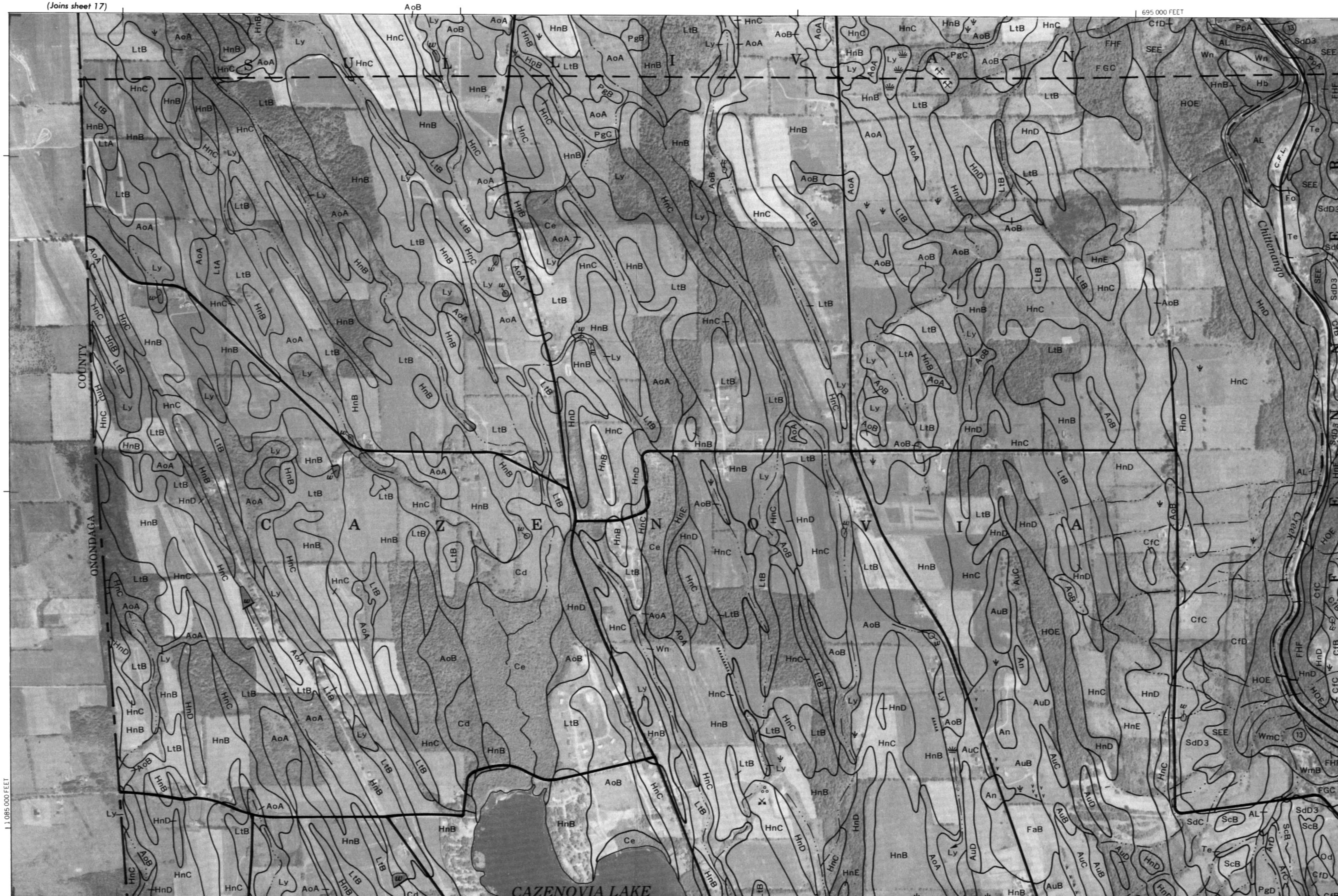
This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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MADISON COUNTY, NEW YORK — SHEET NUMBER 22

N



Scale 1:15 840

1 Mile; 5 000 Feet; 0; 1 000; 2 000; 3 000; 4 000; 5 000; ¼; ½; ¾; 1

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MADISON COUNTY, NEW YORK — SHEET NUMBER 23



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MADISON COUNTY, NEW YORK — SHEET NUMBER 24



This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

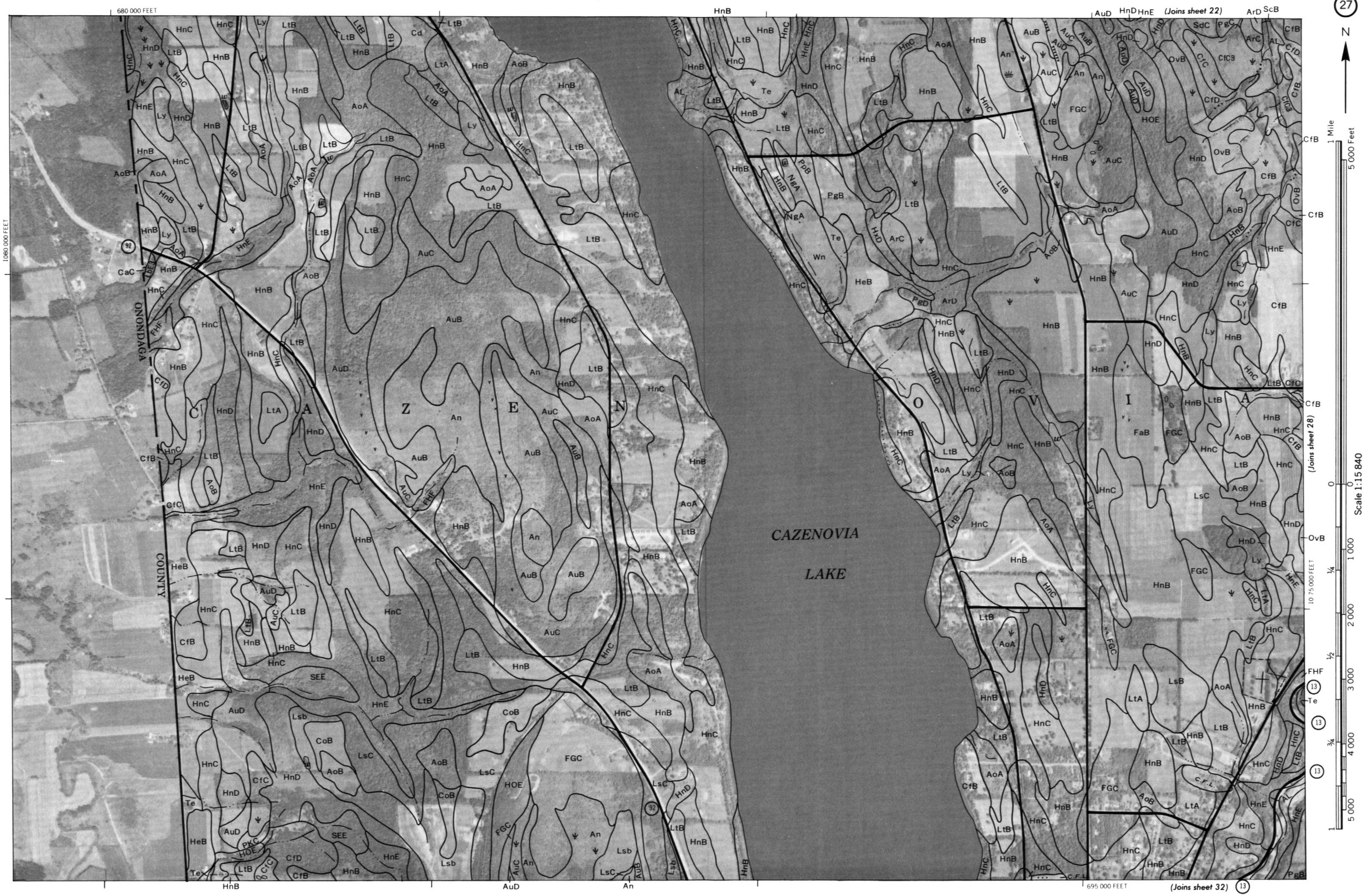


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MADISON COUNTY, NEW YORK — SHEET NUMBER 26



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31
N
(Joins sheet 26)
(Joins sheet 30)
(Joins sheet 36)
765 000 FEET
1 080 000 FEET
1 075 000 FEET
750 000 FEET
Munnsville West Hill
STOCKBRIDGE
VALLEY
QUARRY
Oak Hill
Oneida
Creek
Blue Creek
Oriskany Creek
Bridges Corners
ONEIDA COUNTY
STOCKBRIDGE
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1 Mile
5 000 Feet
Scale 1:15 840



This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

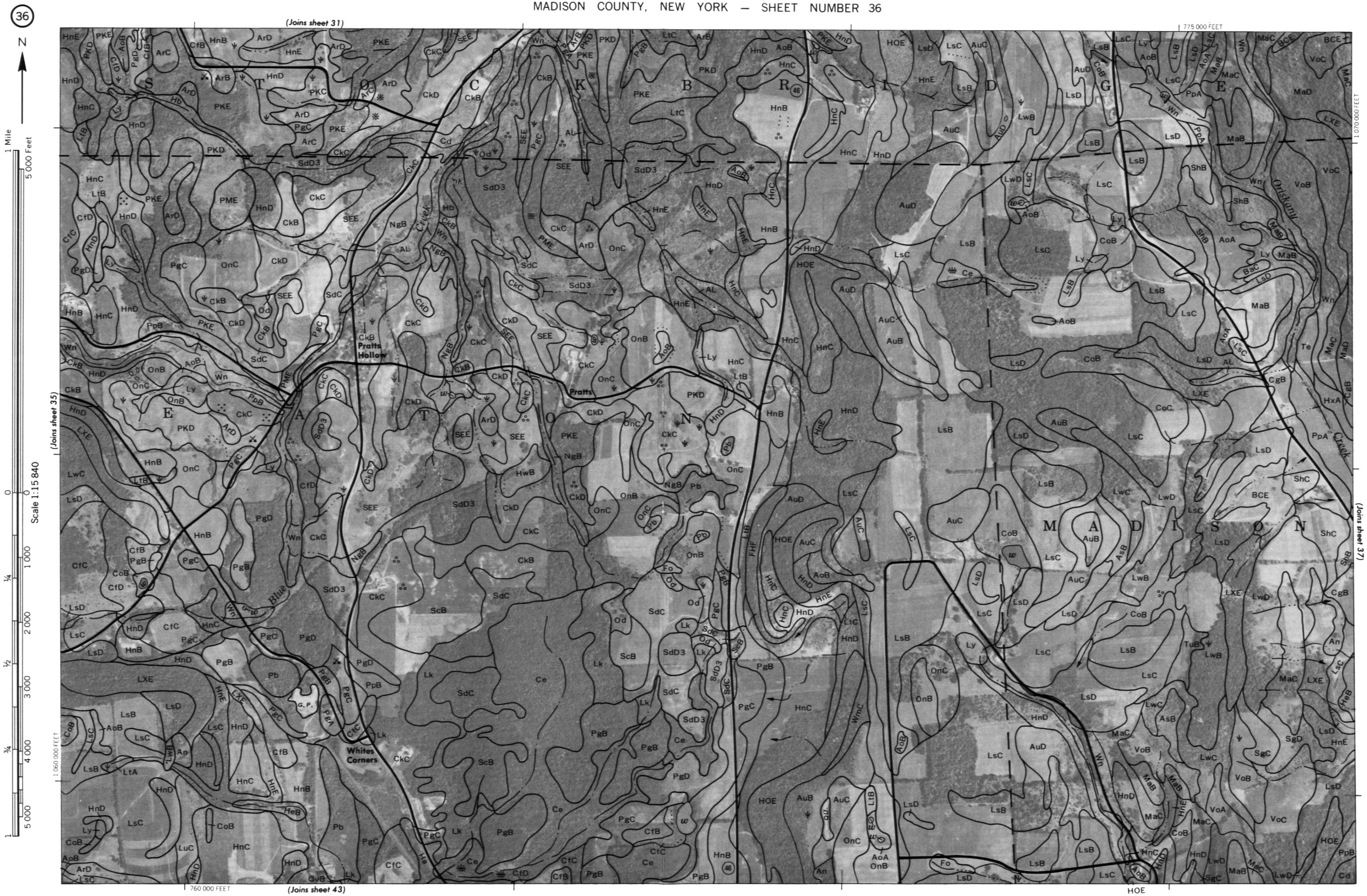


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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MADISON COUNTY, NEW YORK — SHEET NUMBER 36



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37



N

Scale 1:15 840

1 Mile

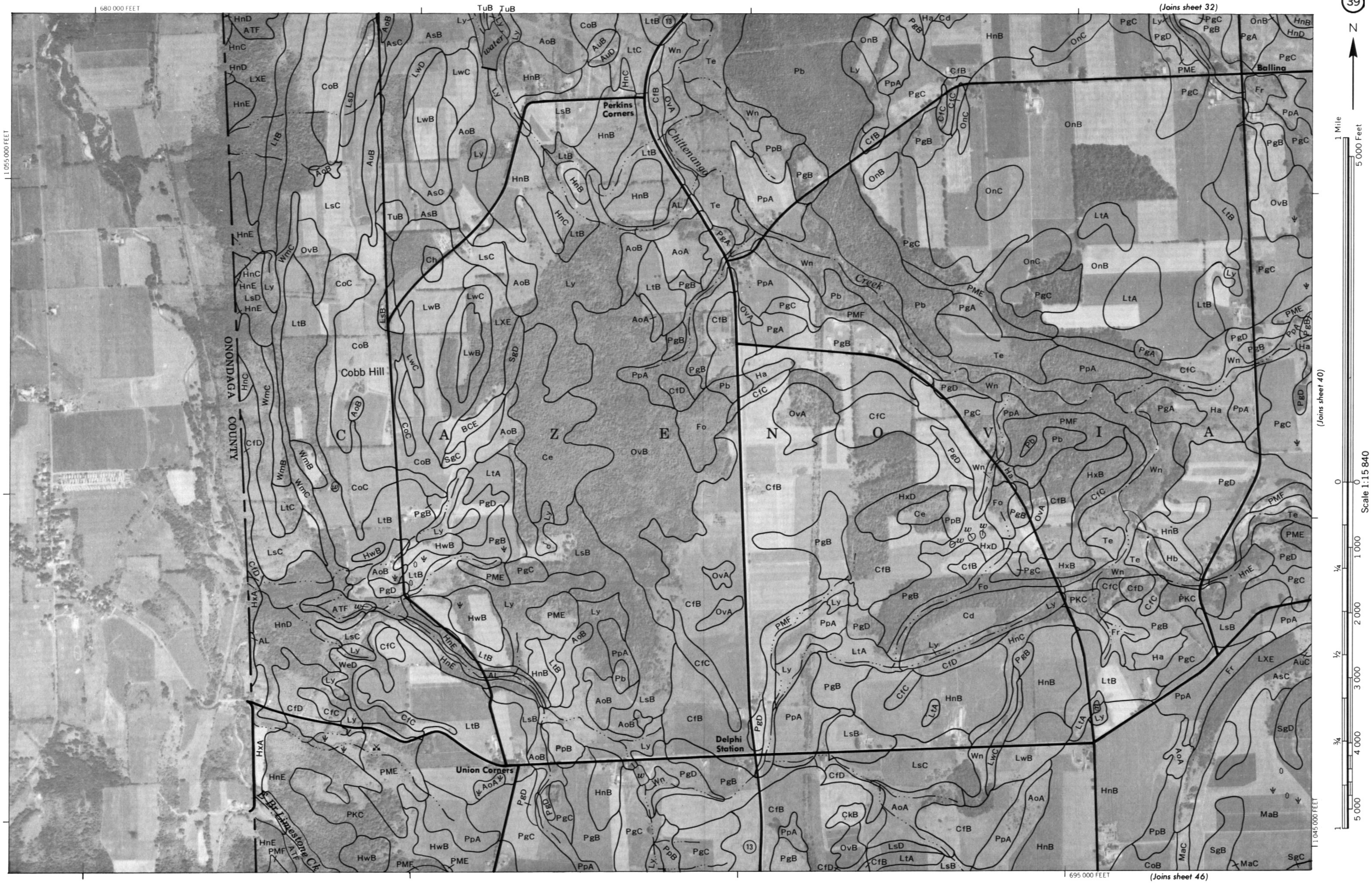
5 000 Feet

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

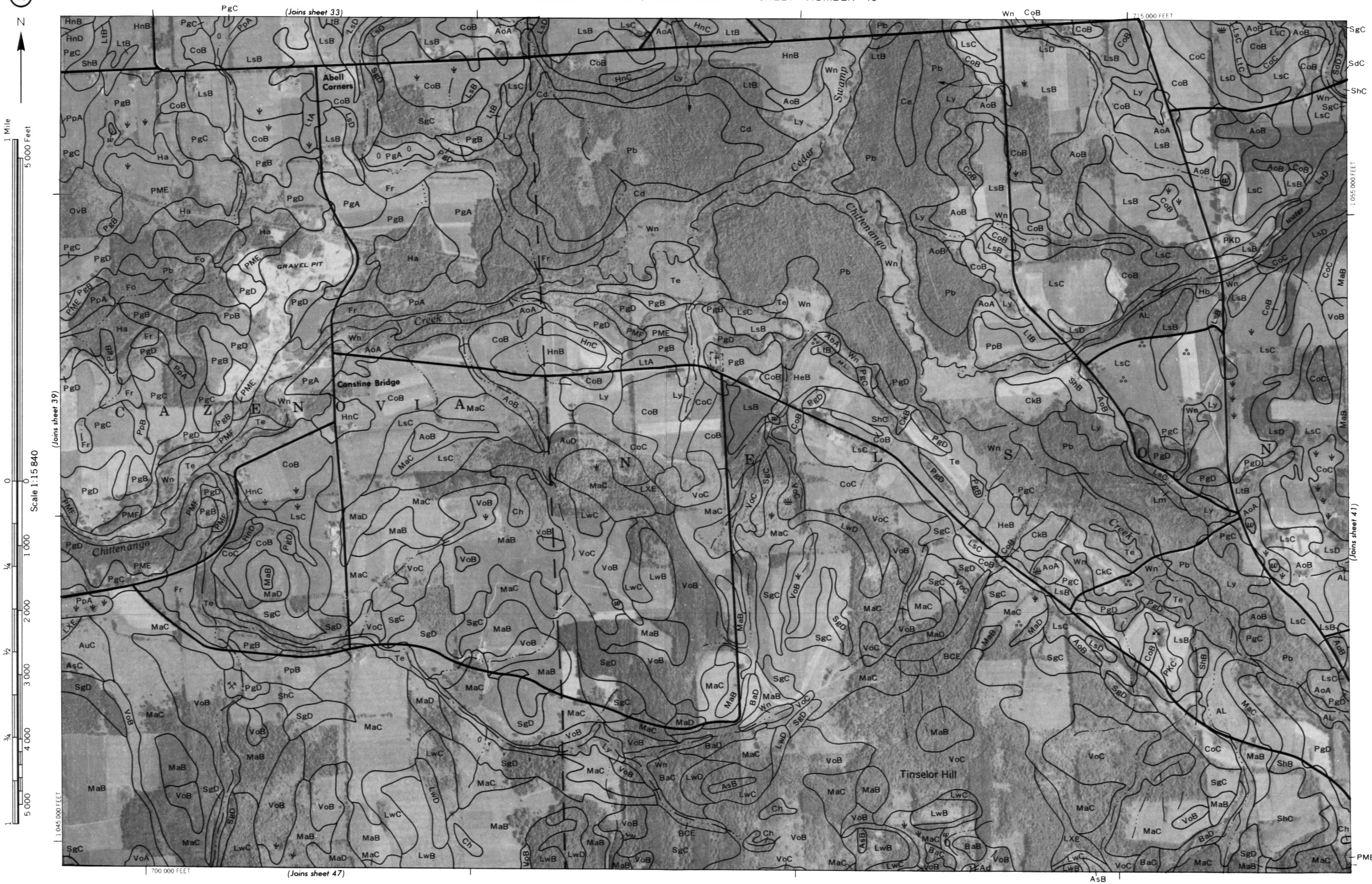
MADISON COUNTY, NEW YORK — SHEET NUMBER 38



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MADISON COUNTY, NEW YORK — SHEET NUMBER 42

N

Scale 1:15 840

1 Mile — ¾ — ½ — ¼ — 0

5 000 Feet — 4 000 — 3 000 — 2 000 — 1 000 — 0 — 5 000

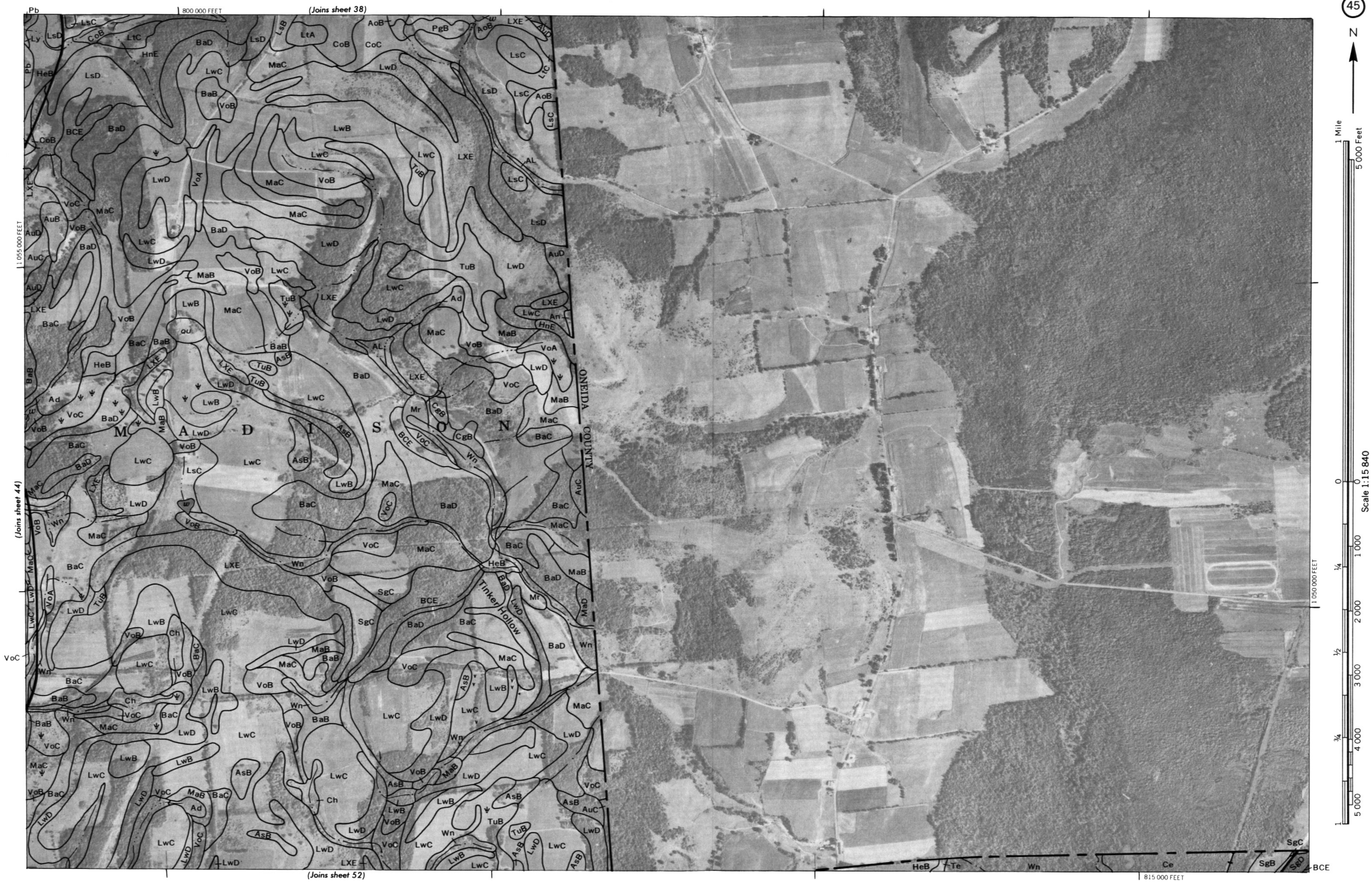


This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

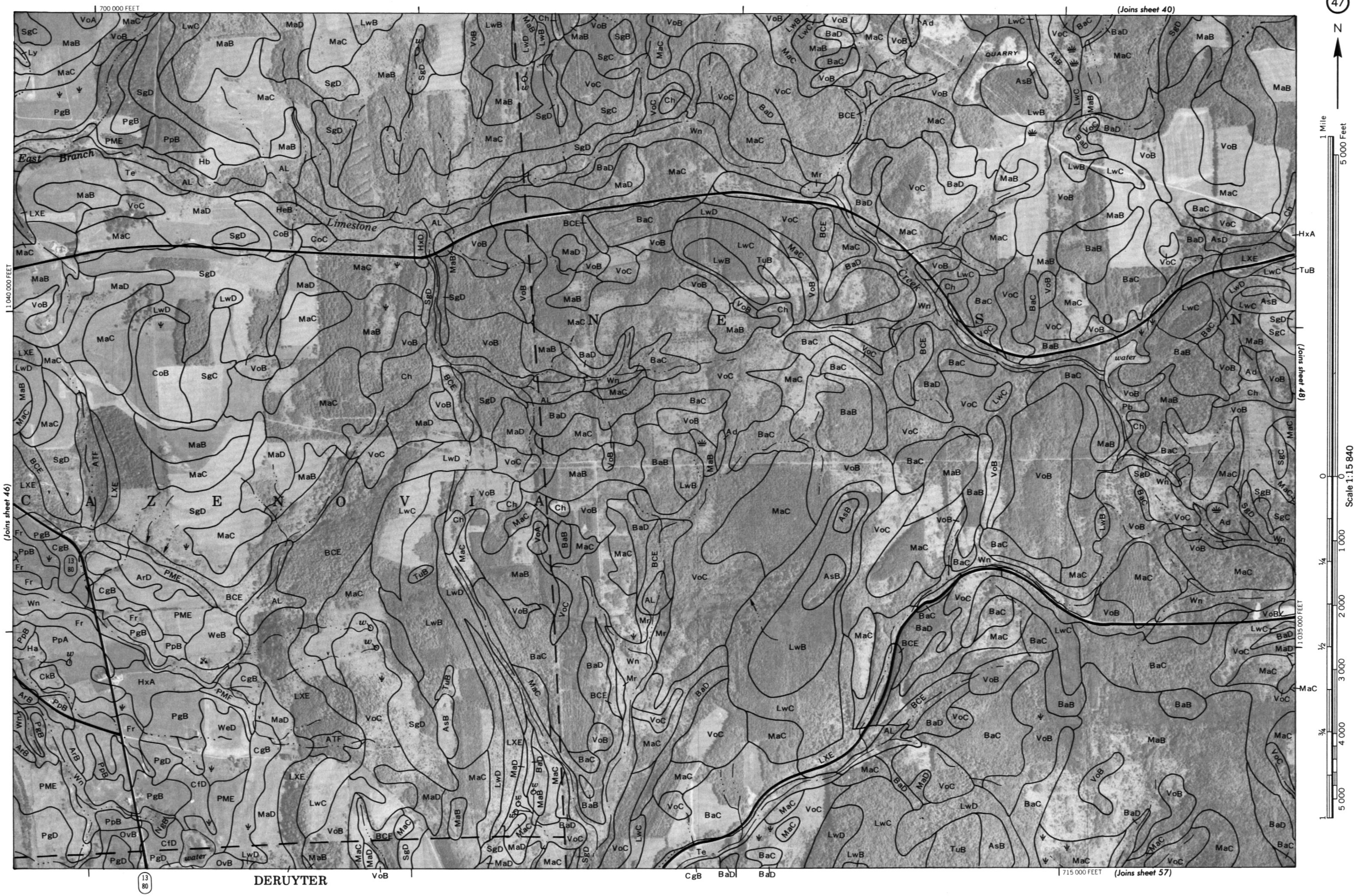

44
N
(Joins sheet 37)
(Joins sheet 43)
(Joins sheet 45)
LwB (Joins sheet 51)
1 795 000 FEET
1 055 000 FEET
1 050 000 FEET
780 000 FEET
Scale 1:15 840
1 Mile
5 000 Feet
Madison
Madison Lake
water
Johnnycake Hill
Payne Brook
Madison Center
Lake Moraine
M A D I S O N
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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48
N
(Joins sheet 41)
(Joins sheet 47)
(Joins sheet 49)
(Joins sheet 58)
Tuscarora
Lake
Jackass Hill
Eaton Brook
Reservoir
Erieville
Otselic
River
N E L S O N
GEORGETOWN
735 000 FEET
1 045 000 FEET
1 035 000 FEET
720 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1

MADISON COUNTY, NEW YORK — SHEET NUMBER 49



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MADISON COUNTY, NEW YORK — SHEET NUMBER 50





N

Scale 1:15 840

1 Mile; 5 000 Feet; 0; ¼; ½; ¾; 1; 1 000; 2 000; 3 000; 4 000; 5 000

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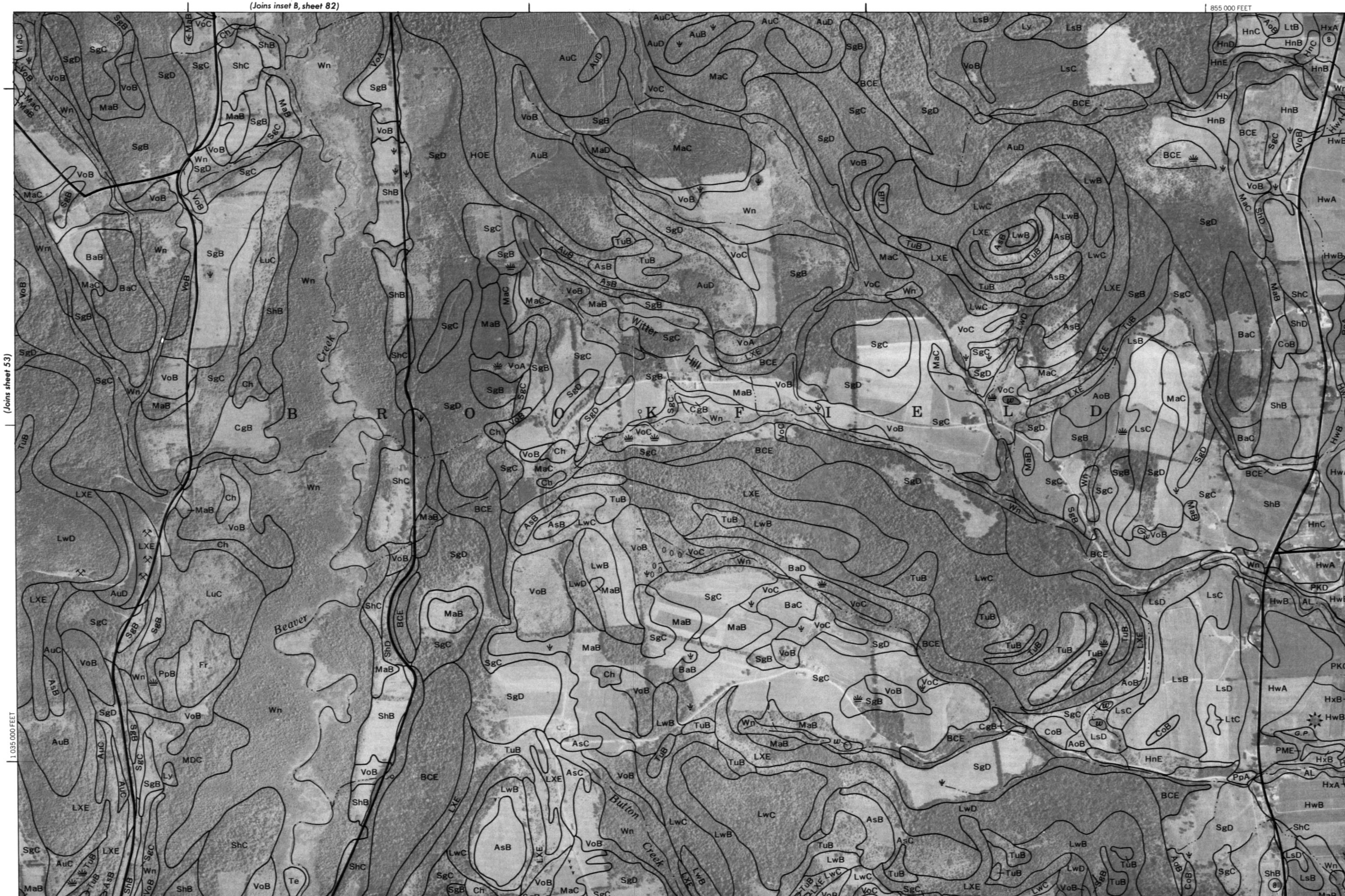
This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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(Joins inset B, sheet 82)

(Joins sheet 53)



(Joins sheet 55)

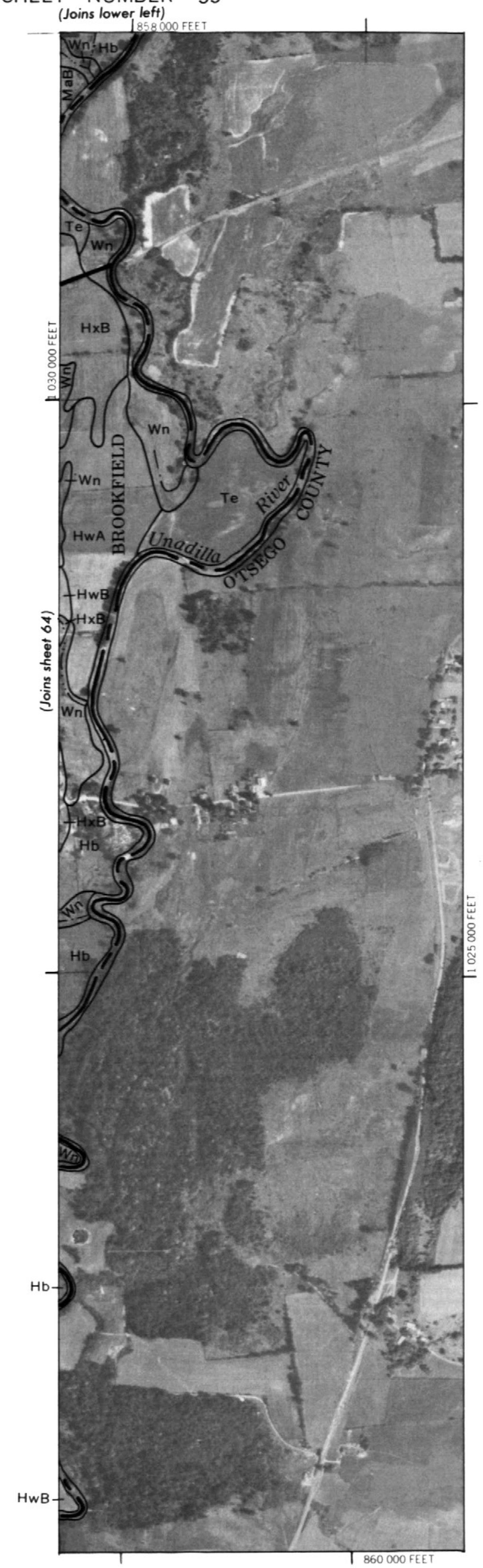
(Joins sheet 64)

N

1 Mile
5 000 Feet
Scale 1:15 840
0 ¼ ½ ¾ 1
0 1 000 2 000 3 000 4 000 5 000

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N

1 Mile

5 000 Feet

Scale 1:15 840

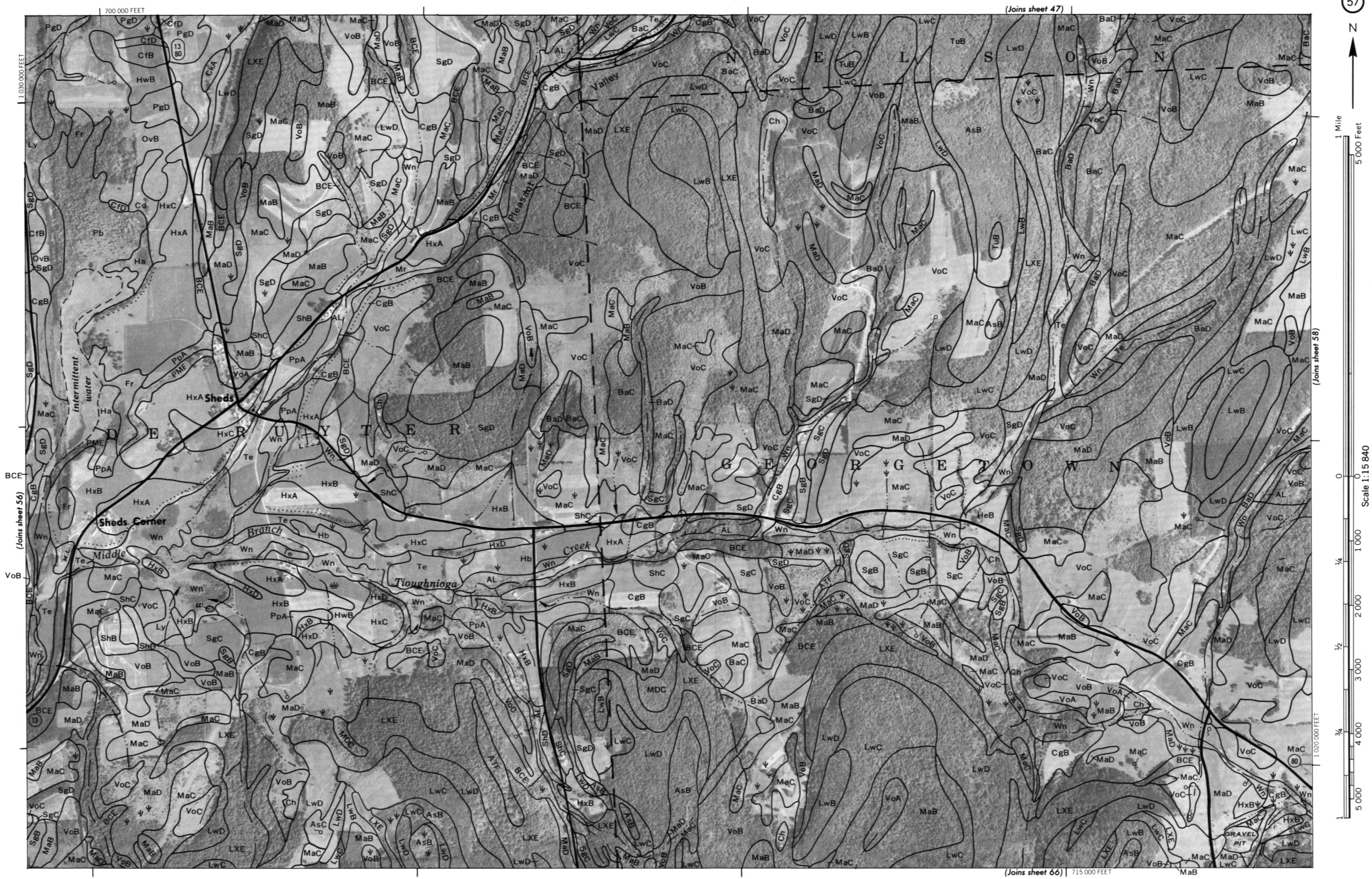
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2000 AND 5000 FOOT GRID TICKS

MADISON COUNTY, NEW YORK — SHEET NUMBER 56

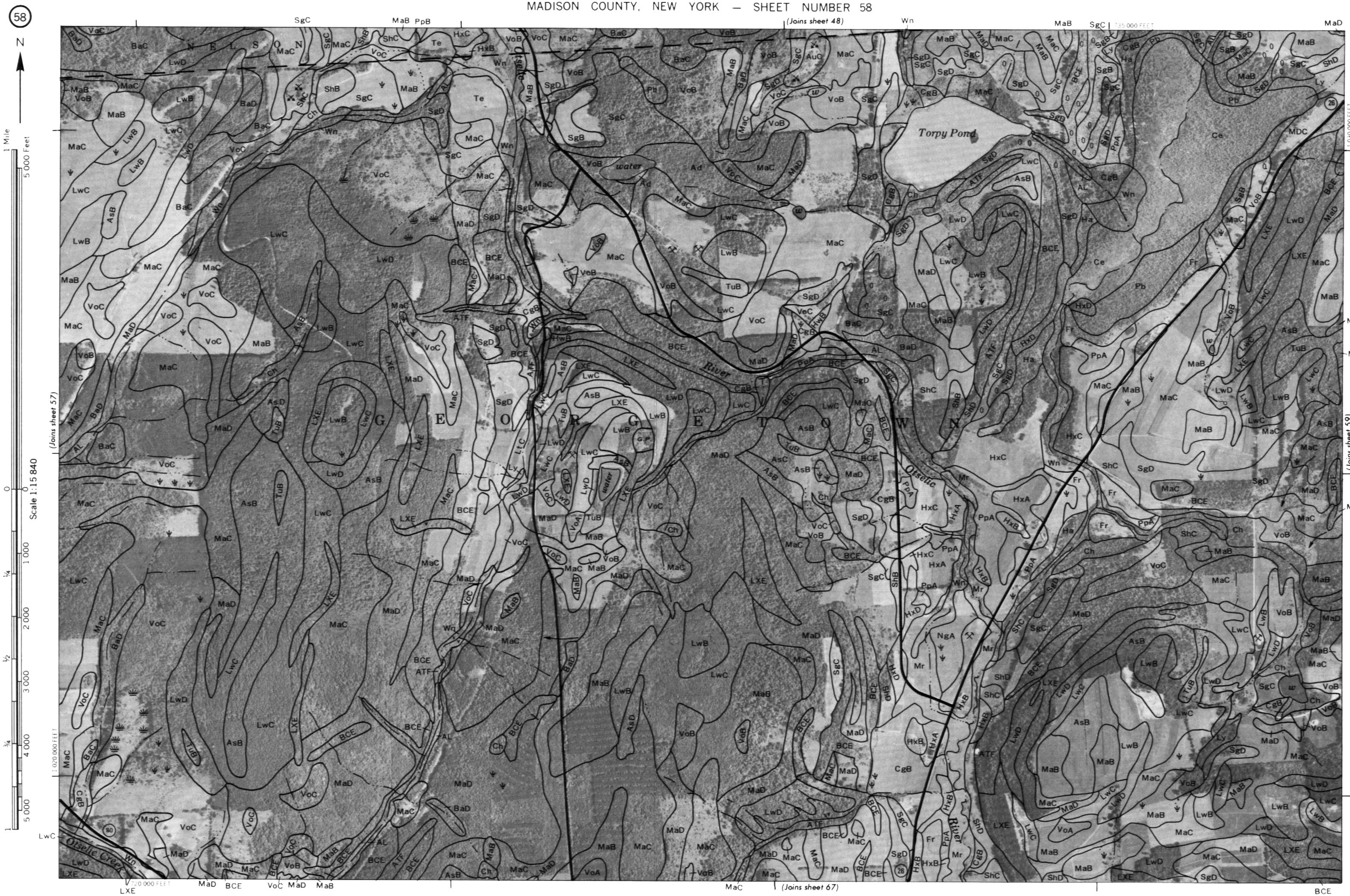


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This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MADISON COUNTY, NEW YORK — SHEET NUMBER 58

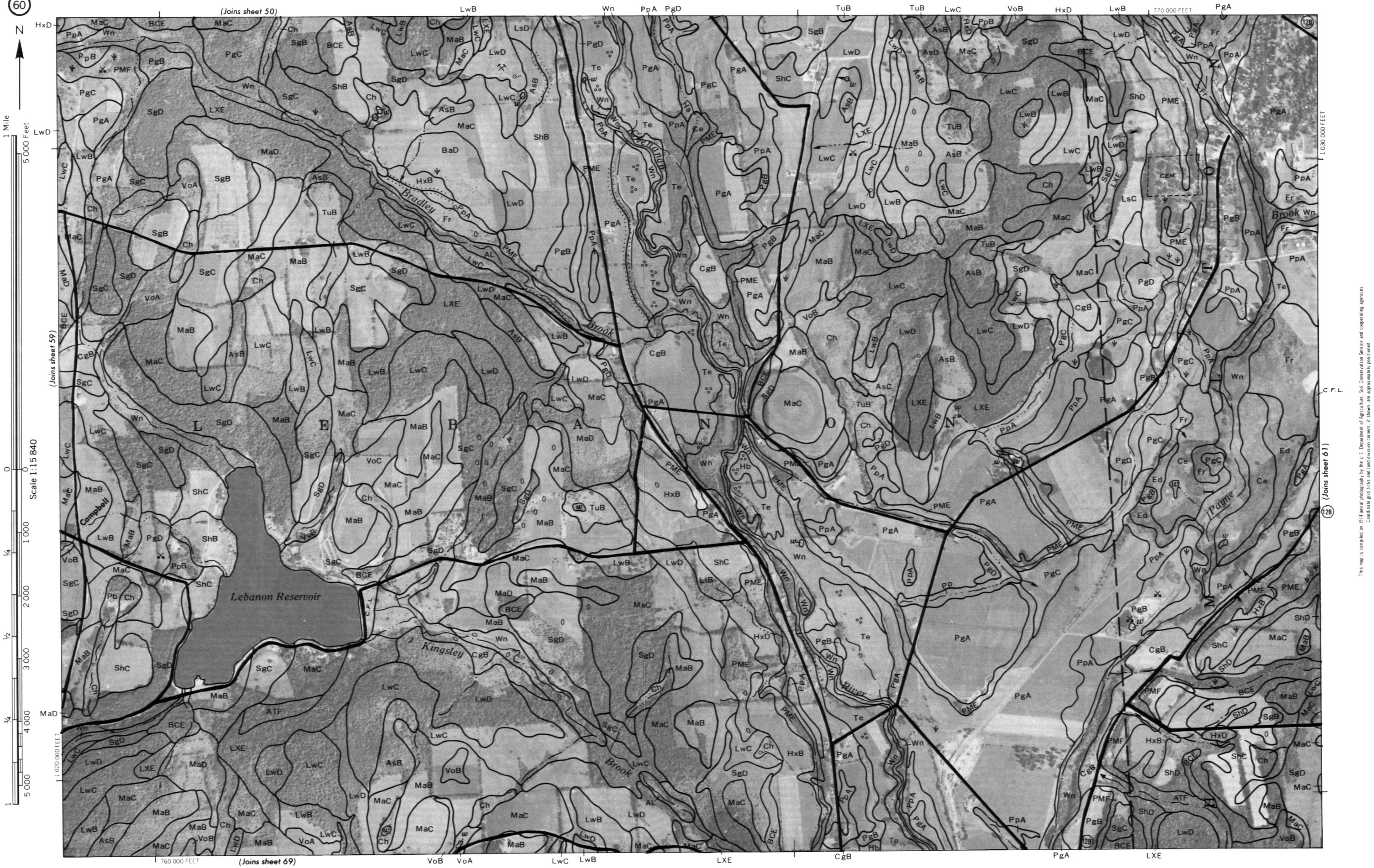


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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MADISON COUNTY, NEW YORK — SHEET NUMBER 60

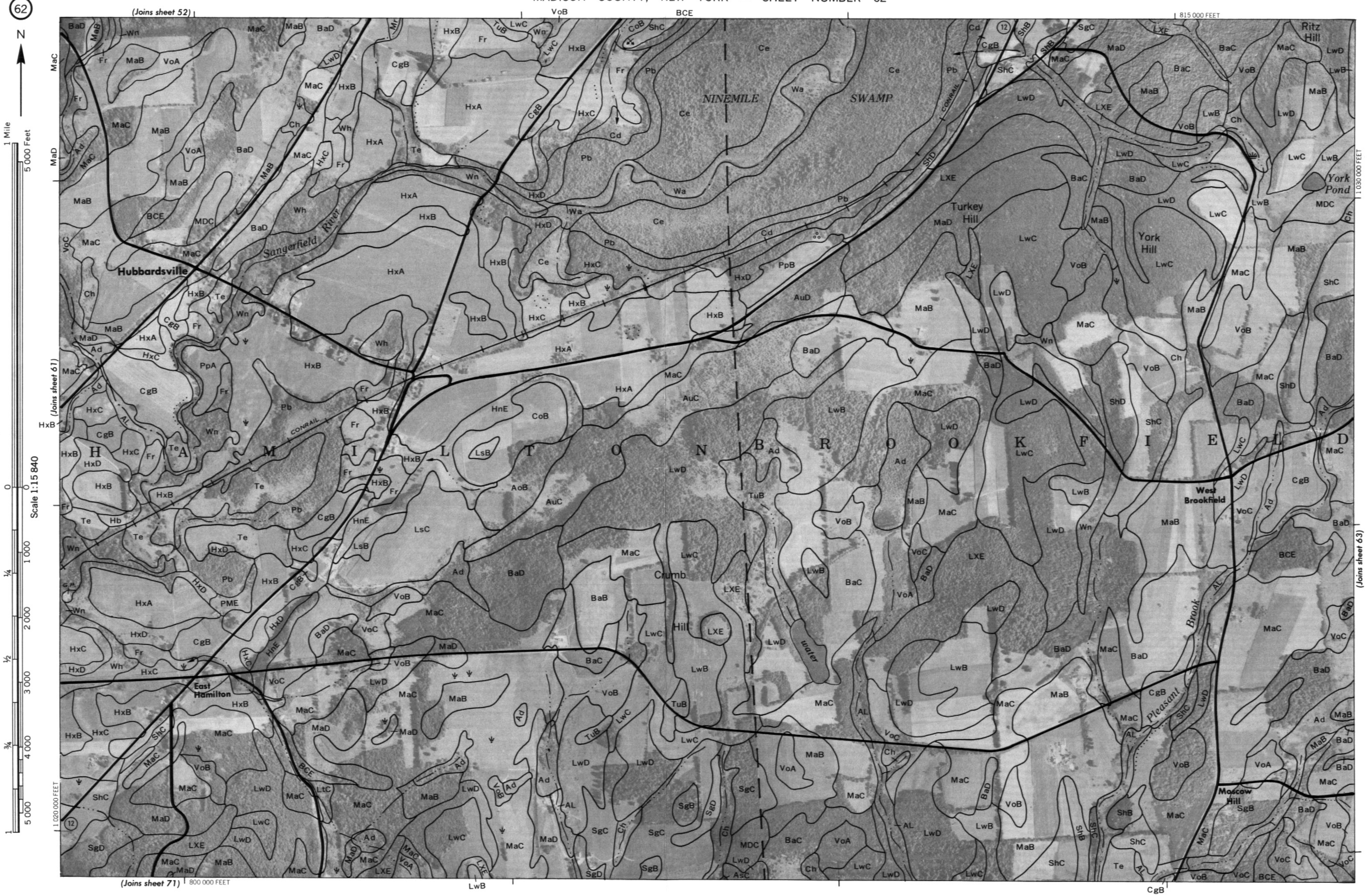


MADISON COUNTY, NEW YORK — SHEET NUMBER 61

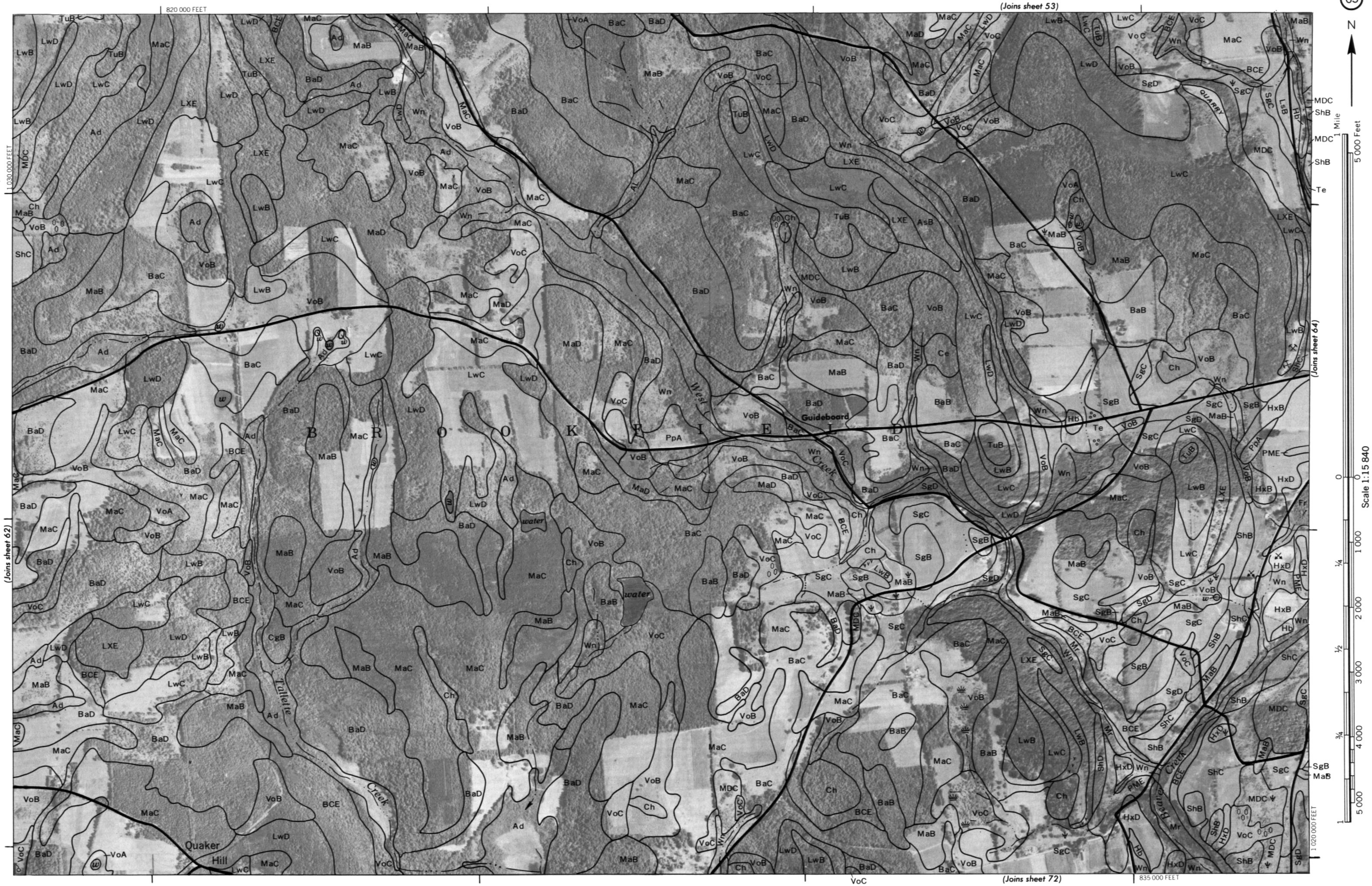


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MADISON COUNTY, NEW YORK — SHEET NUMBER 62



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67
N
(Joins sheet 58)
(Joins sheet 66)
(Joins sheet 68)
(Joins sheet 76)
720 000 FEET
735 000 FEET
1 015 000 FEET
1 010 000 FEET
Georgetown
G E O R G E T O W N
Otselic River
Otselic Creek
South Branch
Lebanon Brook
Muller Brook
Scale 1:15 840
1 Mile
5 000 Feet
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MADISON COUNTY, NEW YORK — SHEET NUMBER 68





69
N
(Joins sheet 60)
(Joins sheet 68)
(Joins sheet 70)
(Joins sheet 78)
760 000 FEET
775 000 FEET
1 015 000 FEET
1 010 000 FEET
Middleport
Lebanon Center
Kingsley Brook
Chenango River
Stone Mill Brook
Earlville Lake
LEBANON
HAMILTON
Scale 1:15 840
1 Mile
5 000 Feet
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.


70
N
(Joins sheet 61)
(Joins sheet 69)
(Joins sheet 71)
(Joins sheet 79)
795 000 FEET
1 015 000 FEET
1 010 000 FEET
780 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
Hamilton Center
Poolville
Poolville Pond
Loomis Corners
Brooks Corners
Sangerfield River
CEMETERY
CONRAIL
HAMILTON
This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(Joins sheet 64)

(Joins sheet 72)



(Joins sheet 82)

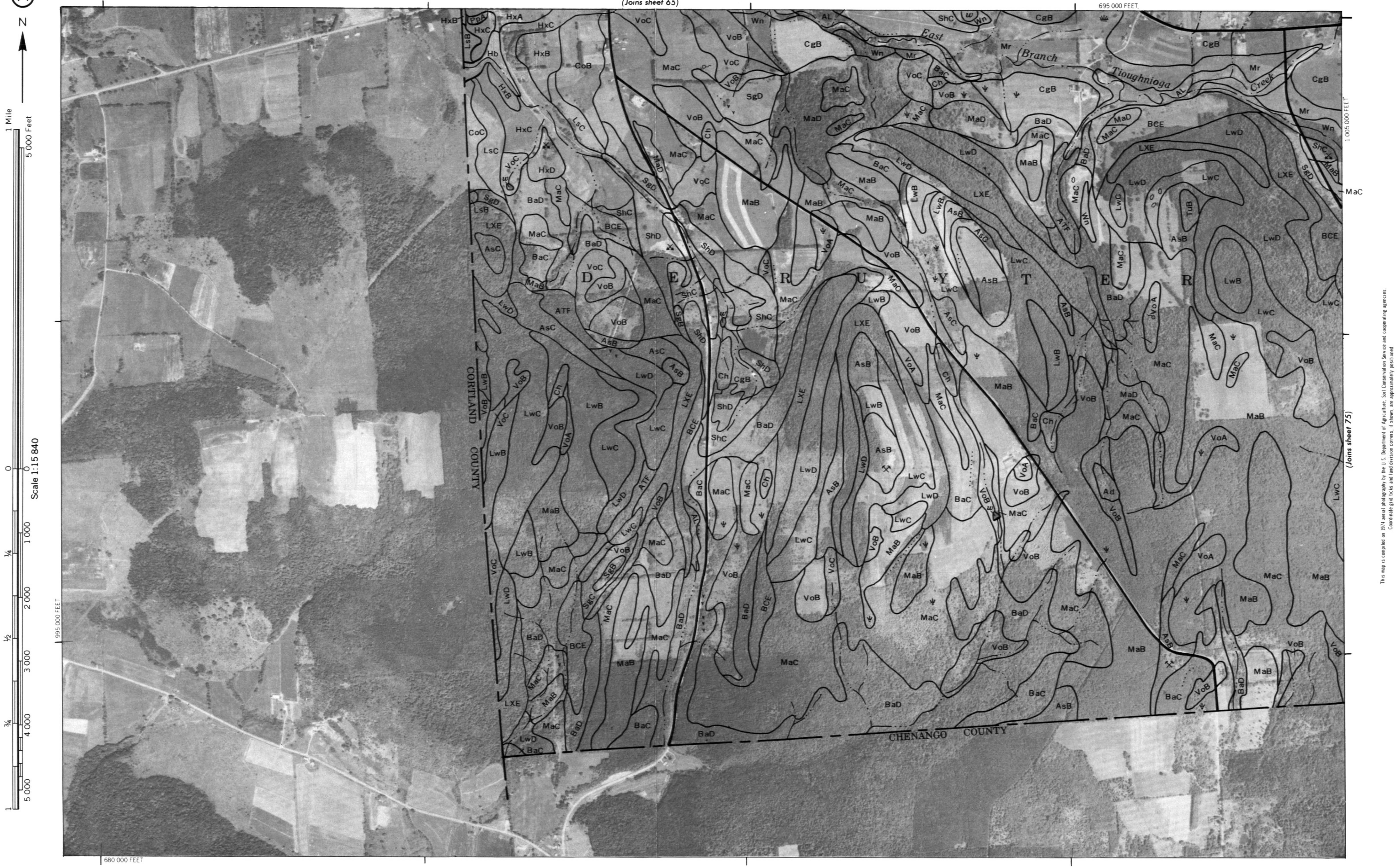
N

Scale 1:15 840

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(74)

MADISON COUNTY, NEW YORK — SHEET NUMBER 74





N

Scale 1:15 840

1 Mile

5 000 Feet

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MADISON COUNTY, NEW YORK — SHEET NUMBER 76



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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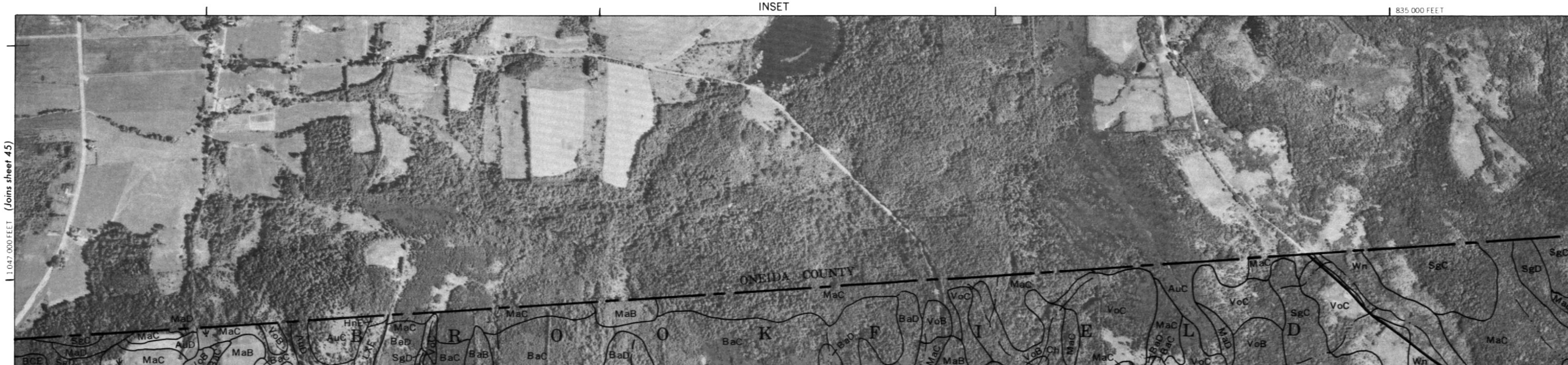
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MADISON COUNTY, NEW YORK — SHEET NUMBER 81

81



INSET

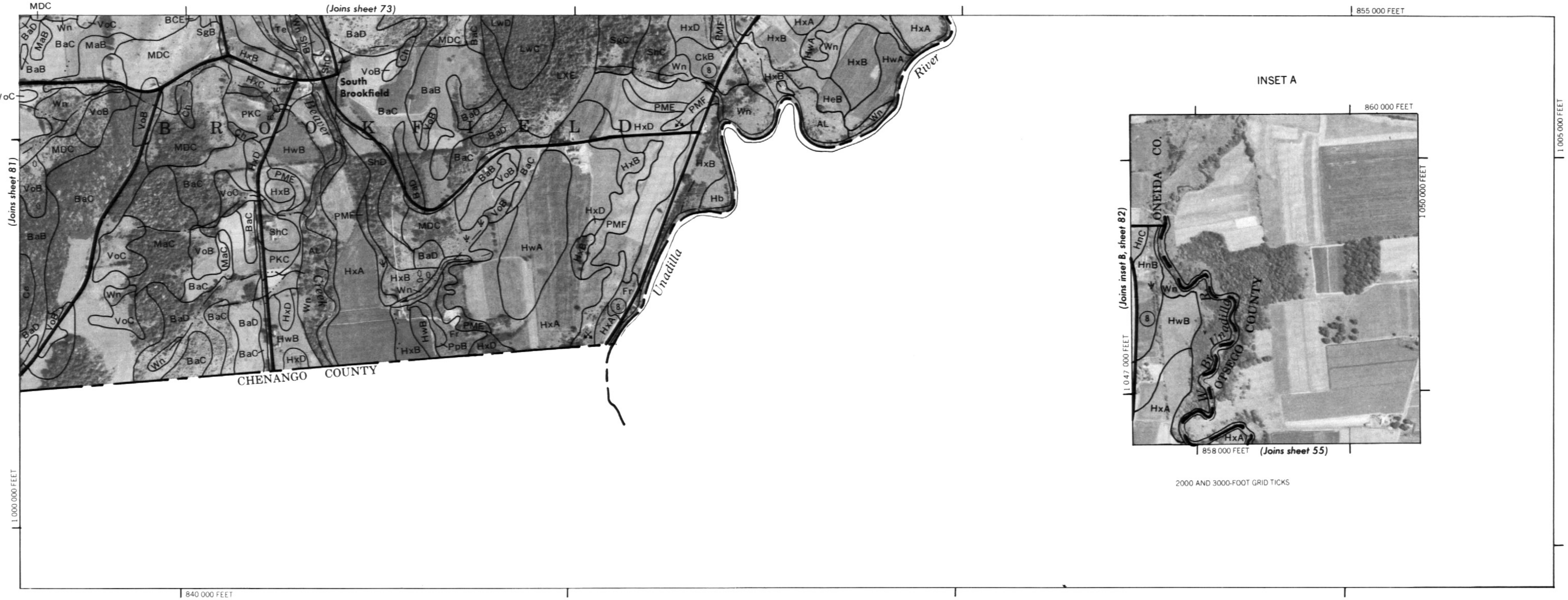


N

1 Mile
5 000 Feet
0 ¼ ½ ¾ 1 Mile
0 1 000 2 000 3 000 4 000 5 000
Scale 1:15 840

3000 AND 5000-FOOT GRID TICKS

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

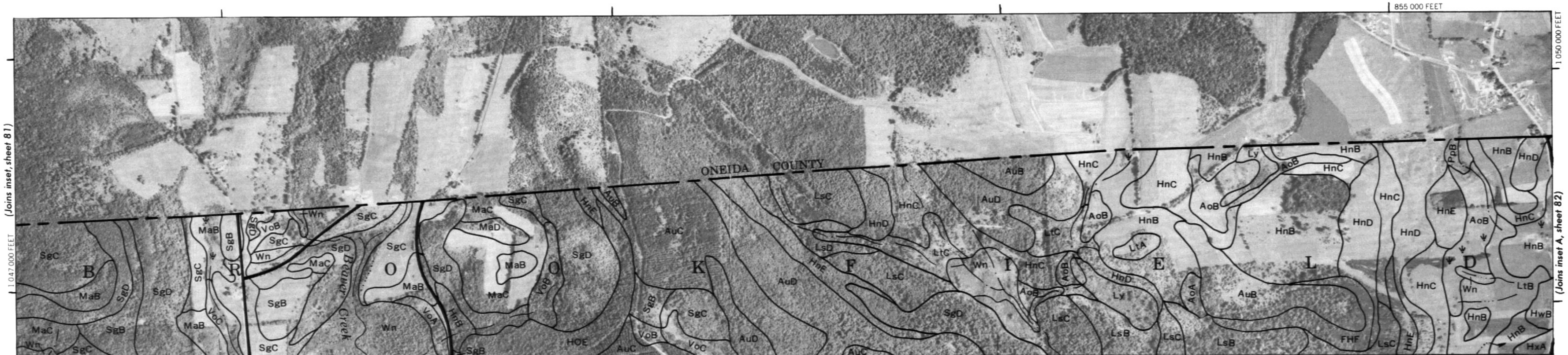


N

Scale 1:15 840

1 Mile | 5 000 Feet | 0 | 0 | 1 000 | ¼ | 2 000 | ½ | 3 000 | ¾ | 4 000 | 5 000 | 1

INSET B



3000 AND 5000-FOOT GRID TICKS

This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.